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PowerFlex® DC

TECHNICAL DATA

DIGITAL DC DRIVE

ALLEN-BRADLEY • ROCKWELL SOFTWARE

Rockwell Automation

Product Overview

The PowerFlex Digital DC drive provides digital control for precise speed and current regulation, easy programmability, extensive diagnostics, non-regenerative and regenerative operation, and is easily interfaced for integration into larger drive systems. PowerFlex DC drives are well suited to a variety of applications including extruding operations, finishing, drawing, and coating processes, applications exhibiting shock loads, high inertia, rapid accel/decel or continuous regeneration, and is an excellent choice for existing DC machinery upgrades. The compact design of this drive includes a fully contained power module and a common control structure for the entire range of horsepower. And, to make connectivity even easier, the PowerFlex DC drive provides a standard DPI interface that is compatible with all PowerFlex DPI communication products.

The standard hardware offering consists of an open type enclosure, armature converter, regulated field converter for field weakening or economy applications, an advanced regulator with integrated DPI functionality, DC tachometer and encoder capability.

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Reference Materials

For additional PowerFlex DC data and general drive information, refer to the following publications:

Title	Publication	Available Online at . . .
PowerFlex DC User Manual	20P-UM001...	www.rockwellautomation.com/literature
A Global Reference Guide for Reading Schematic Diagrams	100-2.10	
Guarding Against Electrostatic Damage	8000-4.5.2	
Preventive Maintenance of Industrial Control and Drive System Equipment	DRIVES-TD001...	
Safety Guidelines for the Application, Installation and Maintenance of Solid State Control	SGI-1.1	

For other information, contact Allen-Bradley Drives Technical Support:

Title	Online at . . .
Allen-Bradley Drives Technical Support	www.ab.com/support/abdrives

Standard Drives Program

Packaging and Mounting

- **IP20, Nema/UL Type Open** - For conventional mounting inside or outside a control cabinet.

Easy to Use Communication Tools

The PowerFlex Digital DC drive provides common communication tools that are familiar and easy to use, including the LCD Human Interface Module (HIM) and PC-based configuration tools.

- The LCD HIM provides:
  - Large and easy to read 7 line x 21 character, backlit display
  - Alternate function keys for shortcuts to common tasks
  - “Calculator-like” number pad for fast and easy data entry (Full Numeric version only)
  - Control keys for local start, stop, speed, and direction
  - Remote versions for panel mount applications
- PC-based Configuration tools include:
  - DriveExplorer™ and DriveExplorer Lite (v5.02 or higher). A simple and flexible “On-line” tool for monitoring and configuring while connected to a drive.
  - DriveTools™ SP (v4.01 or higher is required with a PowerFlex DC drive specific software patch. The patch can be downloaded from http://www.ab.com/support/abdrives/webupdate/). A suite of software tools which provide an intuitive means for programming, troubleshooting and maintaining Allen-Bradley drives, including the PowerFlex DC Drive Start-Up Wizard.
- Internal Communications allow you to integrate the drive into the manufacturing process. Status indicators for all internal communication options are visible on the cover for easy setup and monitoring of drive communications. You can easily manage information from “shop floor to top floor” and seamlessly integrate a complete system as you control, configure and collect data.

Drive Features

- Fast-acting **Current Limit** and **Voltage Regulation** result in maximum accel/decel without tripping.
- **High speed analog inputs** improve drive response to torque or speed commands.
- **Programming flexibility** allows parameters to be linked within the drive.
- **Field flashable firmware** through DPI interface.
- **Flying Start** delivers smooth and instantaneous connection into rotating loads, regardless of commanded direction, without the need for any speed feedback.
- **Single Phase Regulated Field supply** (10, 14, & 20A) standard on all frames.
- **Integral Process PI Control** can eliminate the need for a separate process loop controller.
- **Speed Regulation** - Open Loop or Closed Loop
  - Armature Feedback provides a 500:1 rpm speed range
  - DC Tachometer Feedback provides up to 0.1% speed regulation
  - Encoder Feedback provides up to 0.1% speed regulation for the tightest application requirements.
- **Torque Regulation** - Open Loop or Closed Loop
  - Open Loop torque regulation provides ±5% regulation.
  - Encoder Feedback provides ±2% regulation and the ability to hold full load at zero speed.

Unsurpassed Capability in Network Communications

PowerFlex drives are fully compatible with the wide variety of Allen-Bradley DPI™ communication adapters, offering the following benefits:

ControlNet™	DeviceNet™	EtherNet/IP™	Interbus™	LonWorks™	PROFIBUS™	Remote I/O	RS485 DF1	Description
✔	✔	✔						**(Unconnected Messaging)** permits other network devices (e.g. PanelView™) to communicate directly to a drive without routing the communication through the network scanner.
✔	✔	✔					✔	**Adapter Routing** - Plug PC into one drive and talk to all other Allen-Bradley drives on same network, without being routed through network scanner.
✔	✔	✔	✔	✔	✔	✔	✔	Access to 100% of all parameters over the network.
	✔	✔			✔			**AutoBaud** capability makes initial connections less problematic.
	✔							**Change of State** significantly reduces network traffic by configuring control messages to be sent only upon customer defined states. Very flexible configuration for each node (Example: “reference must change by more than 5%”).
	✔	✔						**Peer Control** provides master-slave type control between drives, where one or more slave drives (consumers) can run based on the status of a master drive (producer), which can also significantly reduce network traffic.
	✔							**ADR (Automatic Device Replacement)** saves significant time and effort when replacing a drive, by allowing the scanner to be configured to automatically detect a new drive and download the required parameter settings.
✔	✔	✔	✔	✔	✔	✔	✔	**Flexible Fault Configuration** - Adapters can be programmed to take fault based actions as ramp to stop, coast-to-stop and hold last state, as well as send user configurable logic control and speed reference values. In addition, different actions can be taken based on whether the network experienced a serious problem (broken cable etc.) versus network idle condition (PLC set to “Program”).

Catalog Number Explanation

Position	1-3	4	5	6	7	8-10	11	12	13	14	15	16
	20P	4	1	A	D	4P1	R	N	0	N	N	N
	a	b	c	d	e	f	g	h	i	j	k	l

a

Drive	
Code	Type
20P	PowerFlex DC

b

Motor Operation	
Code	Type
2	Two Quadrant Operation
4	Four Quadrant Operation

c

Input Type	
Code	Type
1	6 Pulse
2	12 Pulse

d

Enclosure		
Code	Enclosure Rating	Conform. Coat
A	IP20, NEMA/UL Type Open	No
B	IP43, NEMA/UL Type 1 - Filter	No
G	IP54, NEMA/UL Type 12	No
H	IP54, NEMA/UL Type 12 - Fan/Filter	No
N	IP00, NEMA/UL Type Open	No

e

Input Voltage	
Code	Voltage
B	230V ac
C	400V ac
D	460V ac
E	600V ac
F	690V ac

f1

230V, 60 Hz Input				
Code	Hp	Armature Amps	Frame	Field Amps
7P0	1.5	7	A	10
9P0	2	9	A	10
012	3	12	A	10
020	5	20	A	10
029	7.5	29	A	10
038	10	38	A	10
055	15	55	A	10
073	20	73	A	14
093	25	93	A	14
110	30	110	A	14
146	40	146	B	20
180	50	180	B	20
218	60	218	B	20
265	75	265	B	20
360	100	360	B	20
434	125	434	B	20
521	150	521	C	20

f2

460V, 60 Hz Input				
Code	Hp	Armature Amps	Frame	Field Amps
4P1	2	4.1	A	10
6P0	3	6	A	10
010	5	10	A	10
014	7.5	14	A	10
019	10	19	A	10
027	15	27	A	10
035	20	35	A	10
045	25	45	A	10
052	30	52	A	10
073	40	73	A	14
086	50	86	A	14
100	60	100	A	14
129	75	129	A	14
167	100	167	B	20
207	125	207	B	20
250	150	250	B	20
330	200	330	B	20
412	250	412	B	20
495	300	495	C	20
667	400	667	C	20

g

Field Supply	
Code	Type
A	Three-Phase Regulated
F	Fixed Field w/Economy
R	Single-Phase Regulated

h

Packaging/Documentation		
Code	Shipping Carton	User Manual
0	No	No
A	Yes	Yes
N	Yes	No
Q	No	Yes

i

HIM	
Code	Operator Interface
0	Blank Cover ∗

∗ Standard - for more selections, see "Human Interface and Wireless Interface Modules" on page 6.

j

I/O Options	
Code	Control
A	I/O Expansion Card (4 Additional 24V dc Digital Inputs & Outputs, 2 Analog Outputs)
B	115V ac Conversion Card (8 Digital Inputs & Outputs)
C	I/O Expansion Card + 115V ac Conversion
N	None (8 - 24V dc Digital Inputs & Outputs, 3 Analog Outputs and 2 Analog Inputs are Standard)

k

Communication Options	
Code	Description
N	None ∗

∗ Standard - for more selections, see "Communication Options Kits" on page 7.

l

Cabinet Options	
Code	Type
N	None

Factory Installed Options

Each PowerFlex DC drive includes one encoder and DC analog tachometer input. No other factory installed options are available at this time.

User Installed Options

Human Interface and Wireless Interface Modules

No HIM (Blank Plate)
20-HIM-A0

LCD Display, Full Numeric Keypad
20-HIM-A3

LCD Display, Programmer Only
20-HIM-A5

Wireless Interface Module
20-WIM-N1

Remote (Panel Mount) LCD Display, Full Numeric Keypad
20-HIM-C3S

Remote (Panel Mount) LCD Display, Programmer Only
20-HIM-C5S

Remote (Panel Mount) Wireless Interface Module
20-WIM-N4S

Description	Handheld/Local (Drive Mount) Cat. No.	Remote (Panel Mount) IP66, NEMA/UL Type 4x/12 ✶ Cat. No.
No HIM (Blank Plate)	20-HIM-A0	–
LCD Display, Full Numeric Keypad	20-HIM-A3	20-HIM-C3S ‡
LCD Display, Programmer Only	20-HIM-A5	20-HIM-C5S ‡
Wireless Interface Module	20-WIM-N1	20-WIM-N4S

✶ For indoor use only.
‡ Includes a 1202-C30 interface cable (3 meters) for connection to drive.

Human Interface Module Accessories

Description	Cat. No.
Bezel Kit for LCD HIMs, NEMA/UL Type 1 ‡	20-HIM-B1
PowerFlex HIM Interface Cable, 1 m (39 in) ♣	20-HIM-H10
Cable Kit (Male-Female) ➢	
0.33 Meters (1.1 Feet)	1202-H03
1 Meter (3.3 Feet)	1202-H10
3 Meter (9.8 Feet)	1202-H30
9 Meter (29.5 Feet)	1202-H90
DPI/SCANport™ One to Two Port Splitter Cable	1203-S03

‡ Includes a 1202-C30 interface cable (3 meters) for connection to drive.
♣ Required only when HIM is used as handheld or remote.
➢ Required in addition to 20-HIM-H10 for distances up to a total maximum of 10 Meters (32.8 Feet).

I/O Option Kit

Description	Cat. No.
I/O Expansion board	20P-S5V62
115V ac to 24V dc 8 Channel I/O Converter Board	20P-S520L

User Installed Options, Continued

Communication Option Kits

Description	Cat. No.
BACnet ® MS/TP RS485 Communication Adapter	20-COMM-B
ControlNet™ Communication Adapter (Coax)	20-COMM-C
DeviceNet™ Communication Adapter	20-COMM-D
EtherNet/IP™ Communication Adapter	20-COMM-E
HVAC Communication Adapter ❖	20-COMM-H
Interbus™ Communication Adapter	20-COMM-I
LonWorks ® Communication Adapter ♠	20-COMM-L
PROFIBUS™ DP Communication Adapter	20-COMM-P
ControlNet™ Communication Adapter (Fiber)	20-COMM-Q
Remote I/O Communication Adapter	20-COMM-R
RS485 DF1 Communication Adapter	20-COMM-S
External Communications Kit Power Supply	20-XCOMM-AC-PS1
DPI External Communications Kit	20-XCOMM-DC-BASE
External DPI I/O Option Board ✦	20-XCOMM-IO-OPT1
Compact I/O to DPI/SCANport Module	1769-SM1
Serial Null Modem Adapter	1203-SNM
Smart Self-powered Serial Converter (RS232) includes 1203-SFC and 1202-C10 Cables	1203-SSS
Universal Serial Bus™ (USB) Converter includes 2m USB, 20-HIM-H10 & 22-HIM-H10 Cables	1203-USB

✦ For use only with External DPI Communications Kits 20-XCOMM-DC-BASE.

❖ Only ModBus RTU can be used with Vector Control.

♠ Can only be used with Standard Control.

PC Programming Software

Description	
DriveTools™ SP Software ✦	See publication 9303-PL002… for ordering/pricing information.
DriveExplorer™ Software (Lite/Full) ✦❖	
Pocket DriveExplorer™ Software	

✦ Set-up wizards are available for use with DriveTools SP and DriveExplorer (Lite/Full) only.

❖ DriveExplorer Lite is available for free download at: http://www.ab.com/drives/driveexplorer/free_download.html

Isolation Transformers

Isolation Transformers are available for installations that have specific types of AC supply configurations or require drive protection due to AC line disturbances.

		230V AC Three Phase Primary Voltage		460V AC Three Phase Primary Voltage	
Drive output Rating	Transformer Output Rating	230V AC Secondary	460V AC Secondary	230V AC Secondary	460V AC Secondary
kW (HP)	kVA	Catalog Number	Catalog Number	Catalog Number	Catalog Number
1.2 - 2.2 (1.5 - 3)	5	1321-3TW005-AA	1321-3TW005-AB	1321-3TW005-BA	1321-3TW005-BB
3.7 (5)	7.5	1321-3TW007-AA	1321-3TW007-AB	1321-3TW007-BA	1321-3TW007-BB
5.5 (7.5)	11	1321-3TW011-AA	1321-3TW011-AB	1321-3TW011-BA	1321-3TW011-BB
7.5 (10)	14	1321-3TW014-AA	1321-3TW014-AB	1321-3TW014-BA	1321-3TW014-BB
11 (15)	20	1321-3TW020-AA	1321-3TW020-AB	1321-3TW020-BA	1321-3TW020-BB
15 (20)	27	1321-3TW027-AA	1321-3TW027-AB	1321-3TW027-BA	1321-3TW027-BB
18.5 (25)	34	1321-3TW034-AA	1321-3TW034-AB	1321-3TW034-BA	1321-3TW034-BB
22 (30)	40	1321-3TW040-AA	1321-3TW040-AB	1321-3TW040-BA	1321-3TW040-BB
30 (40)	51	1321-3TW051-AA	1321-3TW051-AB	1321-3TW051-BA	1321-3TW051-BB
37 (50)	63	1321-3TH063-AA	1321-3TH063-AB	1321-3TH063-BA	1321-3TH063-BB
45 (60)	75	1321-3TH075-AA	1321-3TH075-AB	1321-3TH075-BA	1321-3TH075-BB
56 (75)	93	1321-3TH093-AA	1321-3TH093-AB	1321-3TH093-BA	1321-3TH093-BB
75 (100)	118	1321-3TH118-AA	1321-3TH118-AB	1321-3TH118-BA	1321-3TH118-BB
93 (125)	145	1321-3TH145-AA	1321-3TH145-AB	1321-3TH145-BA	1321-3TH145-BB
112 (150)	175	1321-3TH175-AA	1321-3TH175-AB	1321-3TH175-BA	1321-3TH175-BB
145 (200)	220	1321-3TH220-AA	1321-3TH220-AB	1321-3TH220-BA	1321-3TH220-BB
187 (250)	275	1321-3TH275-AA	1321-3TH275-AB	1321-3TH275-BA	1321-3TH275-BB
224 (300)	330	1321-3TH330-AA	1321-3TH330-AB	1321-3TH330-BA	1321-3TH330-BB
298 (400)	440	—	1321-3TH440-AB	—	1321-3TH440-BB
373 (500)	550	—	1321-3TH550-AB	—	1321-3TH550-BB
448 (600)	660	—	1321-3TH660-AB	—	1321-3TH660-BB

Drive output Rating	Transformer Output Rating	230V AC Three Phase Primary Voltage		460V AC Three Phase Primary Voltage	
		230V AC Secondary	460V AC Secondary	230V AC Secondary	460V AC Secondary
kW (HP)	kVA	Catalog Number	Catalog Number	Catalog Number	Catalog Number
522 (700)	770		1321-3TH770-AB	—	1321-3TH770-BB
597 (800)	880		1321-3TH880-AB	—	1321-3TH880-BB

AC Input Line Reactors and Contactors

If a DC Contactor is used, an AC Input contactor is not needed.

230V AC Input, Regenerative Drives

Drive Cat. No.	DC Amps	AC Line Amps	HP	IP00 (Open Style) Line Reactor Cat No.	Line Reactor kW (HP)	AC Input Contactor Cat. No.
20P-41AB7P0	7	5.7	1.5	1321-3R8-A	.75 (1)	100-C12D10
20P-41AB9P0	9	7.4	2	1321-3R12-A	1.49 (2)	100-C12D10
20P-41AB012	12	9.8	3	1321-3R18-A	0.75-3.7 (1-5)	100-C12D10
20P-41AB020	20	16	5	1321-3R18-A	0.75-3.7 (1-5)	100-C23D10
20P-41AB029	29	24	7.5	1321-3R55-A	5.5-11 (7.5-15)	100-C30D10
20P-41AB038	38	31	10	1321-3R55-A	5.5-11 (7.5-15)	100-C37D10
20P-41AB055	55	45	15	1321-3R55-A	5.5-11 (7.5-15)	100-C60D10
20P-41AB073	73	60	20	1321-3R80-A	15 (20)	100-C60D10
20P-41AB093	93	76	25	1321-3R100-A	18.5-22 (25-30)	100-C85D10
20P-41AB110	110	90	30	1321-3R100-A	18.5-22 (25-30)	100-D110D11
20P-41AB146	146	119	40	1321-3R160-A	30-37 (40-50)	100-D140D11
20P-41AB180	180	147	50	1321-3R160-A	30-37 (40-50)	100-D180D11
20P-41AB218	218	178	60	1321-3RB250-A	45-56 (60-75)	100-D180D11
20P-41AB265	265	217	75	1321-3RB250-A	45-56 (60-75)	100-D250ED11
20P-41AB360	360	294	100	1321-3RB320-A	75 (100)	100-D300ED11
20P-41AB434	434	355	125	1321-3RB400-A	93 (125)	100-D420ED11
20P-41AB521	521	426	150	1321-3R500-A	112 (150)	100-D630ED11

230V AC Input, Non-Regenerative Drives

Drive Cat. No.	DC Amps	AC Line Amps	HP	IP00 (Open Style) Line Reactor Cat No.	Line Reactor kW (HP)	AC Input Contactor Cat. No.
20P-21AB7P0	7	5.7	1.5	1321-3R8-A	.75 (1)	100-C12D10
20P-21AB9P0	9	7.4	2	1321-3R12-A	1.49 (2)	100-C12D10
20P-21AB012	12	9.8	3	1321-3R18-A	0.75-3.7 (1-5)	100-C12D10
20P-21AB020	20	16	5	1321-3R18-A	0.75-3.7 (1-5)	100-C23D10
20P-21AB029	29	24	7.5	1321-3R55-A	5.5-11 (7.5-15)	100-C30D10
20P-21AB038	38	31	10	1321-3R55-A	5.5-11 (7.5-15)	100-C37D10
20P-21AB055	55	45	15	1321-3R55-A	5.5-11 (7.5-15)	100-C60D10
20P-21AB073	73	60	20	1321-3R80-A	15 (20)	100-C60D10
20P-21AB093	93	76	25	1321-3R100-A	18.5-22 (25-30)	100-C85D10
20P-21AB110	110	90	30	1321-3R100-A	18.5-22 (25-30)	100-D110D11
20P-21AB146	146	119	40	1321-3R160-A	30-37 (40-50)	100-D140D11
20P-21AB180	180	147	50	1321-3R160-A	30-37 (40-50)	100-D180D11
20P-21AB218	218	178	60	1321-3RB250-A	45-56 (60-75)	100-D180D11
20P-21AB265	265	217	75	1321-3RB250-A	45-56 (60-75)	100-D250ED11
20P-21AB360	360	294	100	1321-3RB320-A	75 (100)	100-D300ED11
20P-21AB434	434	355	125	1321-3RB400-A	93 (125)	100-D420ED11
20P-21AB521	521	426	150	1321-3R500-A	112 (150)	100-D630ED11

460V AC Input, Regenerative Drives

Drive Cat. No.	DC Amps	AC Line Amps	HP	IP00 (Open Style) Line Reactor Cat No.	Line Reactor kW (HP)	AC Input Contactor Cat. No.
20P-41AD4P1	4.1	3.3	2	1321-3R4-A	.55 (.75)	100-C12D10
20P-41AD6P0	6	4.9	3	1321-3R8-A	.75 (1)	100-C12D10
20P-41AD010	10	8.2	5	1321-3R18-B	1.5-7.5 (2-10)	100-C12D10
20P-41AD014	14	11.4	7.5	1321-3R18-B	1.5-7.5 (2-10)	100-C12D10
20P-41AD019	19	15.5	10	1321-3R18-B	1.5-7.5 (2-10)	100-C23D10
20P-41AD027	27	22.1	15	1321-3R55-B	11-22 (15-30)	100-C23D10
20P-41AD035	35	28.6	20	1321-3R55-B	11-22 (15-30)	100-C30D10
20P-41AD045	45	36.8	25	1321-3R55-B	11-22 (15-30)	100-C37D10
20P-41AD052	52	42.5	30	1321-3R55-B	11-22 (15-30)	100-C43D10
20P-41AD073	73	59.6	40	1321-3R80-B	30 (40)	100-C60D10
20P-41AD086	86	70.3	50	1321-3R100-B	37-45 (50-60)	100-C85D10
20P-41AD100	100	81.7	60	1321-3R100-B	37-45 (50-60)	100-C85D10
20P-41AD129	129	105.4	75	1321-3R160-B	56-75 (75-100)	100-D110D11
20P-41AD167	167	136.4	100	1321-3R160-B	56-75 (75-100)	100-D140D11
20P-41AD207	207	169.1	125	1321-3RB250-B	93-112 (125-150)	100-D180D11
20P-41AD250	250	204.3	150	1321-3RB250-B	93-112 (125-150)	100-D210ED11
20P-41AD330	330	269.6	200	1321-3RB320-B	149 (200)	100-D300ED11
20P-41AD412	412	336.6	250	1321-3RB400-B	186.4 (250)	100-D420ED11
20P-41AD495	495	404.4	300	1321-3R500-B	223.7 (300)	100-D420ED11
20P-41AD667	667	544.9	400	1321-3R600-B	298.3 (400)	100-D630ED11

460V AC Input, Non-Regenerative Drives

Drive Cat. No.	DC Amps	AC Line Amps	HP	IP00 (Open Style) Line Reactor Cat No.	Line Reactor kW (HP)	AC Input Contactor Cat. No.
20P-21AD4P1	4.1	3.3	2	1321-3R4-A	.55 (.75)	100-C12D10
20P-21AD6P0	6	4.9	3	1321-3R8-A	.75 (1)	100-C12D10
20P-21AD010	10	8.2	5	1321-3R18-B	1.5-7.5 (2-10)	100-C12D10
20P-21AD014	14	11.4	7.5	1321-3R18-B	1.5-7.5 (2-10)	100-C12D10
20P-21AD019	19	15.5	10	1321-3R18-B	1.5-7.5 (2-10)	100-C23D10
20P-21AD027	27	22.1	15	1321-3R55-B	11-22 (15-30)	100-C23D10
20P-21AD035	35	28.6	20	1321-3R55-B	11-22 (15-30)	100-C30D10
20P-21AD045	45	36.8	25	1321-3R55-B	11-22 (15-30)	100-C37D10
20P-21AD052	52	42.5	30	1321-3R55-B	11-22 (15-30)	100-C43D10
20P-21AD073	73	59.6	40	1321-3R80-B	30 (40)	100-C60D10
20P-21AD086	86	70.3	50	1321-3R100-B	37-45 (50-60)	100-C85D10
20P-21AD100	100	81.7	60	1321-3R100-B	37-45 (50-60)	100-C85D10
20P-21AD129	129	105.4	75	1321-3R160-B	56-75 (75-100)	100-D110D11
20P-21AD167	167	136.4	100	1321-3R160-B	56-75 (75-100)	100-D140D11
20P-21AD207	207	169.1	125	1321-3RB250-B	93-112 (125-150)	100-D180D11
20P-21AD250	250	204.3	150	1321-3RB250-B	93-112 (125-150)	100-D210ED11
20P-21AD330	330	269.6	200	1321-3RB320-B	149 (200)	100-D300ED11
20P-21AD412	412	336.6	250	1321-3RB400-B	186.4 (250)	100-D420ED11
20P-21AD495	495	404.4	300	1321-3R500-B	223.7 (300)	100-D420ED11
20P-21AD667	667	544.9	400	1321-3R600-B	298.3 (400)	100-D630ED11

DC Contactors and Dynamic Brake Resistor Kits

230V AC Input, Regenerative Drives

Drive Cat. No.	DC Amps	AC Line Amps	HP	Dynamic Brake Resistor Kit Cat. No.	Armature Voltage (Volts)	DB Resistor Size (ohms)	DB Resistor Size (Watts)	Brake Amps Required	DC Loop Contactor Cat. No.(3)	DC Contactor Crimp Lugs Cat. No.
20P-41AB7P0	7	5.7	1.5	1370-DBL62	240	20	420	12.00	1370-DC56	1370-LG40
20P-41AB9P0	9	7.4	2	1370-DBL63	240	20	420	12.00	1370-DC56	1370-LG40
20P-41AB012	12	9.8	3	1370-DBL64	240	15	420	16.00	1370-DC56	1370-LG40
20P-41AB020	20	16	5	1370-DBL65	240	8.6	420	27.91	1370-DC56	1370-LG40
20P-41AB029	29	24	7.5	1370-DBL66	240	6	345	40.00	1370-DC56	1370-LG40
20P-41AB038	38	31	10	1370-DBL67	240	5	330	48.00	1370-DC56	1370-LG40
20P-41AB055	55	45	15	1370-DBL68	240	3.5	385	68.57	1370-DC56	1370-LG56
20P-41AB073	73	60	20	1370-DBL69	240	2.6	385	92.31	1370-DC110	1370-LG92
20P-41AB093	93	76	25	1370-DBL70	240	2	330	120.00	1370-DC110	1370-LG92
20P-41AB110	110	90	30	1370-DBL71	240	2	330	120.00	1370-DC110	1370-LG110
20P-41AB146	146	119	40	1370-DBL72	240	0.7	280	342.86	1370-DC180	1370-LG160
20P-41AB180	180	147	50	1370-DBL73	240	0.5	365	480.00	1370-DC180	1370-LG180
20P-41AB218	218	178	60	1370-DBL74	240	0.5	365	480.00	1370-DC280	1370-LG228
20P-41AB265	265	217	75	1370-DBL75	240	2	330	120.00	1370-DC280	1370-LG268
20P-41AB360	360	294	100	1370-DBL76	240	1.4	290	171.43	1370-DC360	(5)
20P-41AB434	434	355	125	(1)	240	0.5	1458	651	(4)	(5)
20P-41AB521	521	426	150	(2)	240	0.322	6221	781	(4)	(5)

(1) Qty 4-CUTLER-HAMMER_G3AP50 Two in series, two in parallel. Must be sourced separately from drive.
(2) HUBBELL_Y139W322GB - Must be sourced separately from drive.
(3) Coil voltage = 115V AC, 50/60Hz.
(4) ABB_EHDB520C2P-1L - ABB Contactor for drives with no Dynamic Brake. ABB_EHDB520C-1L - ABB Contactor for drives with Dynamic Brake. Must be sourced separately from drive.
(5) Wire and Lug size dependant on Cabinet dims and local codes. Parallel solutions available.

230V AC Input, Non-Regenerative Drives

Drive Cat. No.	DC Amps	AC Line Amps	HP	Dynamic Brake Resistor Kit Cat. No.	Armature Voltage (Volts)	DB Resistor Size (ohms)	DB Resistor Size (Watts)	Brake Amps Required	DC Loop Contactor Cat. No.(3)	DC Contactor Crimp Lugs Cat. No.
20P-21AB7P0	7	5.7	1.5	1370-DBL62	240	20	420	12.00	1370-DC56	1370-LG40
20P-21AB9P0	9	7.4	2	1370-DBL63	240	20	420	12.00	1370-DC56	1370-LG40
20P-21AB012	12	9.8	3	1370-DBL64	240	15	420	16.00	1370-DC56	1370-LG40
20P-21AB020	20	16	5	1370-DBL65	240	8.6	420	27.91	1370-DC56	1370-LG40
20P-21AB029	29	24	7.5	1370-DBL66	240	6	345	40.00	1370-DC56	1370-LG40
20P-21AB038	38	31	10	1370-DBL67	240	5	330	48.00	1370-DC56	1370-LG40
20P-21AB055	55	45	15	1370-DBL68	240	3.5	385	68.57	1370-DC56	1370-LG56
20P-21AB073	73	60	20	1370-DBL69	240	2.6	385	92.31	1370-DC110	1370-LG92
20P-21AB093	93	76	25	1370-DBL70	240	2	330	120.00	1370-DC110	1370-LG92
20P-21AB110	110	90	30	1370-DBL71	240	2	330	120.00	1370-DC110	1370-LG110
20P-21AB146	146	119	40	1370-DBL72	240	0.7	280	342.86	1370-DC180	1370-LG160
20P-21AB180	180	147	50	1370-DBL73	240	0.5	365	480.00	1370-DC180	1370-LG180
20P-21AB218	218	178	60	1370-DBL74	240	0.5	365	480.00	1370-DC280	1370-LG228
20P-21AB265	265	217	75	1370-DBL75	240	2	330	120.00	1370-DC280	1370-LG268
20P-21AB360	360	294	100	1370-DBL76	240	1.4	290	171.43	1370-DC360	(5)
20P-21AB434	434	355	125	(1)	240	0.5	1458	–	(4)	(5)
20P-21AB521	521	426	150	(2)	240	0.322	6221	–	(4)	(5)

(1) Qty 4-CUTLER-HAMMER_G3AP50 Two in series, two in parallel. Must be sourced separately from drive.
(2) HUBBELL_Y139W322GB - Must be sourced separately from drive.
(3) Coil voltage = 115V AC, 50/60Hz.
(4) ABB_EHDB520C2P-1L - ABB Contactor for drives with no Dynamic Brake. ABB_EHDB520C-1L - ABB Contactor for drives with Dynamic Brake. Must be sourced separately from drive.
(5) Wire and Lug size dependant on Cabinet dims and local codes. Parallel solutions available.

460V AC Input, Regenerative Drives

Drive Cat. No.	DC Amps	AC Line Amps	HP	Dynamic Brake Resistor Kit Cat. No.	Armature Voltage (Volts)	DB Resistor Size (ohms)	DB Resistor Size (Watts)	Brake Amps Required	DC Loop Contactor Cat. No.(4)	DC Contactor Crimp Lugs Cat. No.
20P-41AD4P1	4.1	3.3	2	1370-DBH63	500	81	255	6.17	1370-DC56	1370-LG40
20P-41AD6P0	6	4.9	3	1370-DBH64	500	62	245	8.06	1370-DC56	1370-LG40
20P-41AD010	10	8.2	5	1370-DBH65	500	45	245	11.11	1370-DC56	1370-LG40
20P-41AD014	14	11.4	7.5	1370-DBH66	500	27	350	18.52	1370-DC56	1370-LG40
20P-41AD019	19	15.5	10	1370-DBH67	500	20	420	25.00	1370-DC56	1370-LG40
20P-41AD027	27	22.1	15	1370-DBH68	500	12	405	41.67	1370-DC56	1370-LG40
20P-41AD035	35	28.6	20	1370-DBH69	500	5	330	100.00	1370-DC56	1370-LG40
20P-41AD045	45	36.8	25	1370-DBH70	500	4.5	330	111.11	1370-DC56	1370-LG52
20P-41AD052	52	42.5	30	1370-DBH71	500	3.5	385	142.86	1370-DC56	1370-LG52
20P-41AD073	73	59.6	40	1370-DBH72	500	2.6	345	192.31	1370-DC110	1370-LG92
20P-41AD086	86	70.3	50	1370-DBH73	500	2	345	250.00	1370-DC110	1370-LG92
20P-41AD100	100	81.7	60	1370-DBH74	500	2	345	250.00	1370-DC110	1370-LG110
20P-41AD129	129	105.4	75	1370-DBH75	500	1	270	500.00	1370-DC180	1370-LG140
20P-41AD167	167	136.4	100	1370-DBH76	500	0.7	280	714.29	1370-DC180	1370-LG180
20P-41AD207	207	169.1	125	1370-DBH77	500	0.7	280	714.29	1370-DC280	1370-LG228
20P-41AD250	250	204.3	150	1370-DBH78	500	0.5	365	1000.00	1370-DC280	1370-LG268
20P-41AD330	330	269.6	200	1370-DBH79	500	0.7	280	714.29	1370-DC360	(8)
20P-41AD412	412	336.6	250	(1)	500	0.808	7292	–	(5)	(8)
20P-41AD495	495	404.4	300	(2)	500	0.595	6069	–	(6)	(8)
20P-41AD667	667	544.9	400	(3)	500	0.542	6439	–	(7)	(8)

(1) HUBBELL_Y95W808GB - Must be sourced separately from drive.
(2) HUBBELL_Y101W595GB - Must be sourced separately from drive.
(3) HUBBELL_Y109W542GB - Must be sourced separately from drive.
(4) Coil voltage = 115V AC, 50/60Hz.
(5) ABB_EHDB520C2P-1L - ABB contactor for drives with no dynamic brake. ABB_EHDB520C-1L - ABB contactor for drives with a dynamic brake. Must be sourced separately from drive.
(6) ABB_EHDB650C2P-1L - ABB contactor for drives with no dynamic brake. ABB_EHDB650C-1L - ABB contactor for drives with a dynamic brake. Must be sourced separately from drive.
(7) ABB_EHDB800C2P-1L - ABB contactor for drives with no dynamic brake. ABB_EHDB800C-1L - ABB contactor for drives with a dynamic brake. Must be sourced separately from drive.
(8) Wire and Lug size dependant on Cabinet dims and local codes. Parallel solutions available.

460V AC Input, Non-Regenerative Drives

Drive Cat. No.	DC Amps	AC Line Amps	HP	Dynamic Brake Resistor Kit Cat. No.	Armature Voltage (Volts)	DB Resistor Size (ohms)	DB Resistor Size (Watts)	Brake Amps Required	DC Loop Contactor Cat. No.(4)	DC Contactor Crimp Lugs Cat. No.
20P-21AD4P1	4.1	3.3	2	1370-DBH63	500	81	255	6.17	1370-DC56	1370-LG40
20P-21AD6P0	6	4.9	3	1370-DBH64	500	62	245	8.06	1370-DC56	1370-LG40
20P-21AD010	10	8.2	5	1370-DBH65	500	45	245	11.11	1370-DC56	1370-LG40
20P-21AD014	14	11.4	7.5	1370-DBH66	500	27	350	18.52	1370-DC56	1370-LG40
20P-21AD019	19	15.5	10	1370-DBH67	500	20	420	25.00	1370-DC56	1370-LG40
20P-21AD027	27	22.1	15	1370-DBH68	500	12	405	41.67	1370-DC56	1370-LG40
20P-21AD035	35	28.6	20	1370-DBH69	500	5	330	100.00	1370-DC56	1370-LG40
20P-21AD045	45	36.8	25	1370-DBH70	500	4.5	330	111.11	1370-DC56	1370-LG52
20P-21AD052	52	42.5	30	1370-DBH71	500	3.5	385	142.86	1370-DC56	1370-LG52
20P-21AD073	73	59.6	40	1370-DBH72	500	2.6	345	192.31	1370-DC110	1370-LG92
20P-21AD086	86	70.3	50	1370-DBH73	500	2	345	250.00	1370-DC110	1370-LG92
20P-21AD100	100	81.7	60	1370-DBH74	500	2	345	250.00	1370-DC110	1370-LG110
20P-21AD129	129	105.4	75	1370-DBH75	500	1	270	500.00	1370-DC180	1370-LG140
20P-21AD167	167	136.4	100	1370-DBH76	500	0.7	280	714.29	1370-DC180	1370-LG180
20P-21AD207	207	169.1	125	1370-DBH77	500	0.7	280	714.29	1370-DC280	1370-LG228
20P-21AD250	250	204.3	150	1370-DBH78	500	0.5	365	1000.00	1370-DC280	1370-LG268
20P-21AD330	330	269.6	200	1370-DBH79	500	0.7	280	714.29	1370-DC360	(8)
20P-21AD412	412	336.6	250	(1)	500	0.808	7292	–	(5)	(8)
20P-21AD495	495	404.4	300	(2)	500	0.595	6069	–	(6)	(8)
20P-21AD667	667	544.9	400	(3)	500	0.542	6439	–	(7)	(8)

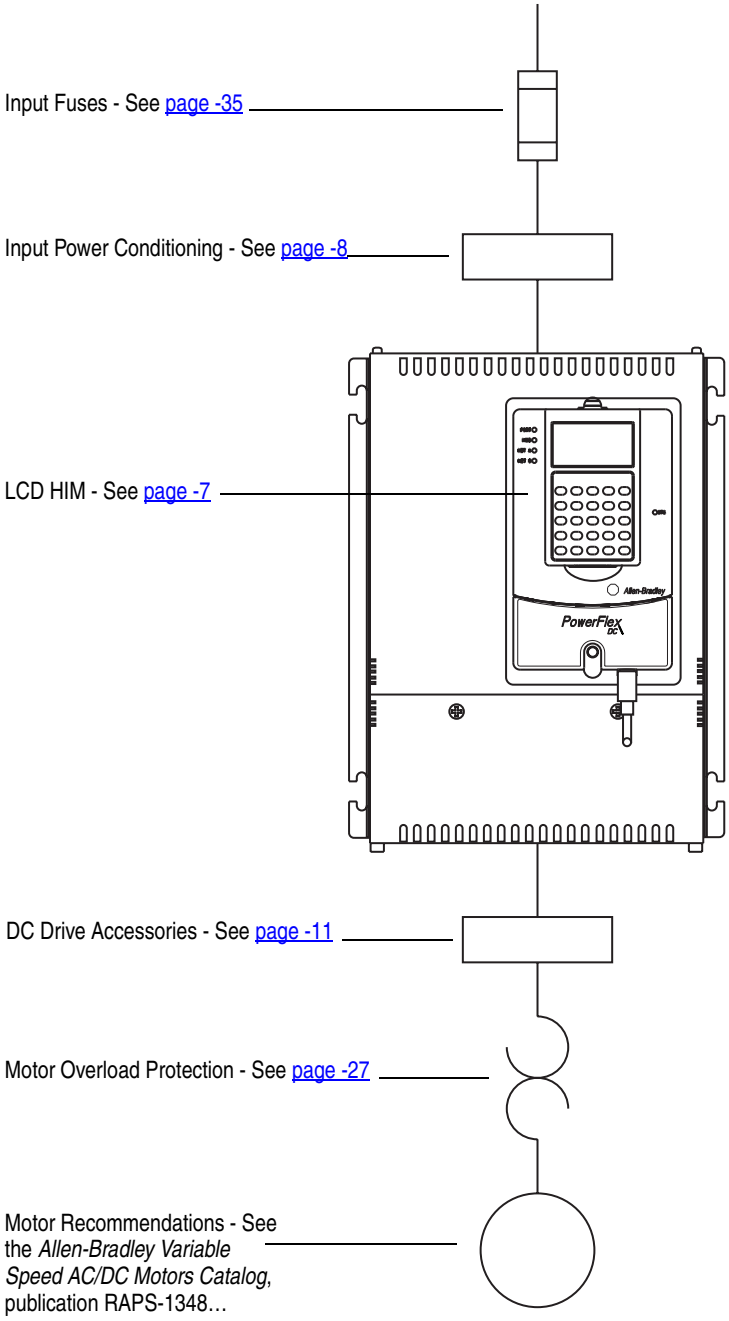
(1) HUBBELL_Y95W808GB - Must be sourced separately from drive.
(2) HUBBELL_Y101W595GB - Must be sourced separately from drive.
(3) HUBBELL_Y109W542GB - Must be sourced separately from drive.
(4) Coil voltage = 115V AC, 50/60Hz.
(5) ABB_EHDB520C2P-1L - ABB contactor for drives with no dynamic brake. ABB_EHDB520C-1L - ABB contactor for drives with a dynamic brake. Must be sourced separately from drive.
(6) ABB_EHDB650C2P-1L - ABB contactor for drives with no dynamic brake. ABB_EHDB650C-1L - ABB contactor for drives with a dynamic brake. Must be sourced separately from drive.
(7) ABB_EHDB800C2P-1L - ABB contactor for drives with no dynamic brake. ABB_EHDB800C-1L - ABB contactor for drives with a dynamic brake. Must be sourced separately from drive.
(8) Wire and Lug size dependant on Cabinet dims and local codes. Parallel solutions available.

Installation Considerations

The PowerFlex Digital DC drive has the following built in protective features to help simplify installation:

- Ground fault protection during start up and running ensures reliable operation
- Electronic motor overload protection increases motor life

There are many other factors that must be considered for optimal performance in any given application. The block diagram below highlights the primary installation considerations.


Input Fuses - See page -35
Input Power Conditioning - See page -8
LCD HIM - See page -7
DC Drive Accessories - See page -11
Motor Overload Protection - See page -27
Motor Recommendations - See the Allen-Bradley Variable Speed AC/DC Motors Catalog, publication RAPS-1348…
Allen-Bradley
PowerFlex DC

Power Wiring

AC Input Voltages

PowerFlex DC drives are rated for the following AC input voltages:

Armature Circuit	Field Circuit	Control Circuit
Terminals U, V, W	Terminals U1, V1	Terminals U2, V2
230V ±10 %, 3Ph	230V ±10 %, 1Ph	115V ±15 %, 1 Ph(1)
400V ±10 %, 3Ph	400V ±10 %, 1Ph	or
440V ±10 %, 3Ph	460V ±10 %, 1Ph	230V ±15 %, 1Ph
460V ±10 %, 3Ph	@ 50/60 Hz ±5 %	@ 50/60 Hz ±5 %
480V ±10 %, 3Ph		
@ 50/60 Hz ±5 %		

(1) For frame B and C drives only, a jumper must be placed between terminals SA-SB on the Switching Power Supply circuit board for the control circuits to work with 115V AC input. Refer to SA-SB Terminal Block Location on Frame B Drives on page 24 and SA-SB Terminal Block Location on Frame C Drives on page 25.

DC Output Voltages

The output voltages below take into account an AC input undervoltage within the stated tolerance limits and a voltage drop of 4% due to an AC input line reactor. It is the same as the rated armature voltage suggested for the connected motor.

Armature Circuit

AC Input Voltage	DC Output Armature Voltage (Terminals C & D)	
(Terminals U, V, W)	Two Quadrant Drive	Four Quadrant Drive
230V ±10 %, 3Ph	260V	240V
400V ±10 %, 3Ph	470V	420V
440V ±10 %, 3Ph	530V	460V
460V ±10 %, 3Ph	560V	480V
480V ±10 %, 3Ph	580V	500V

Field Circuit

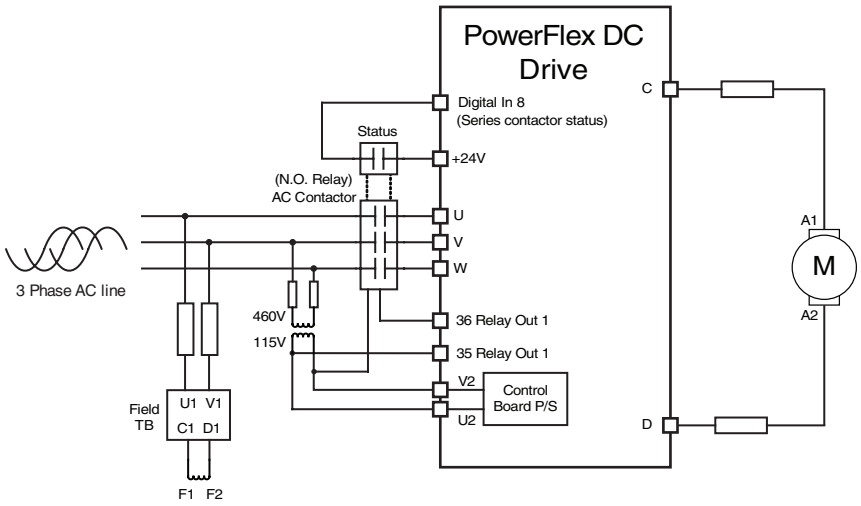
AC Input Voltage	DC Output Field Voltage(1) (Terminals C1 & D1)	
(Terminals U1 & V1)	Fixed Field	Adjustable Field
230V ±15 %, 1Ph	200V	200V
400V ±15 %, 1Ph	310V	310V
460V ±10%, 1Ph	360V	360V

(1) The max field voltage is equal to 0.85 x AC input line voltage

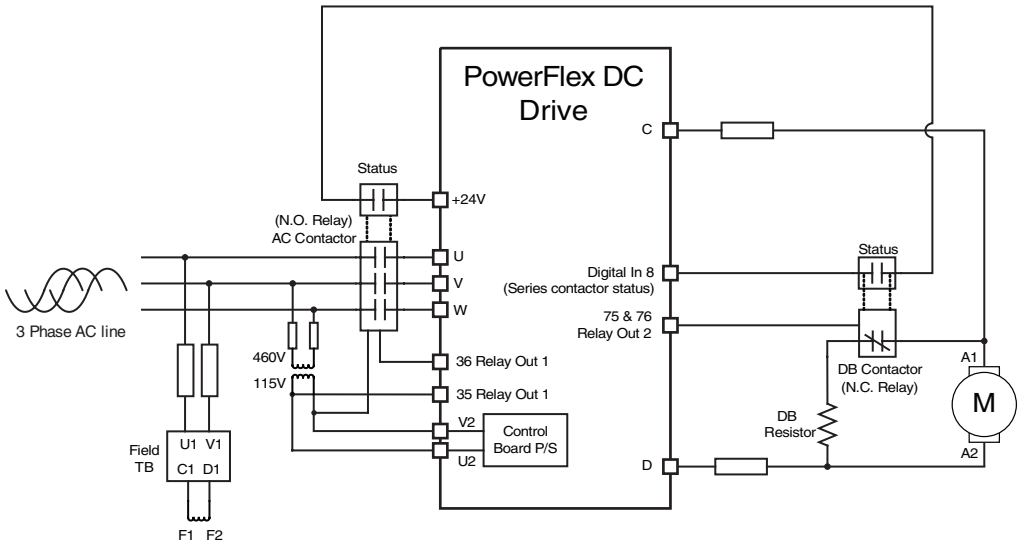
Typical Power Wiring Diagrams

The following diagram represents recommended power wiring configurations:

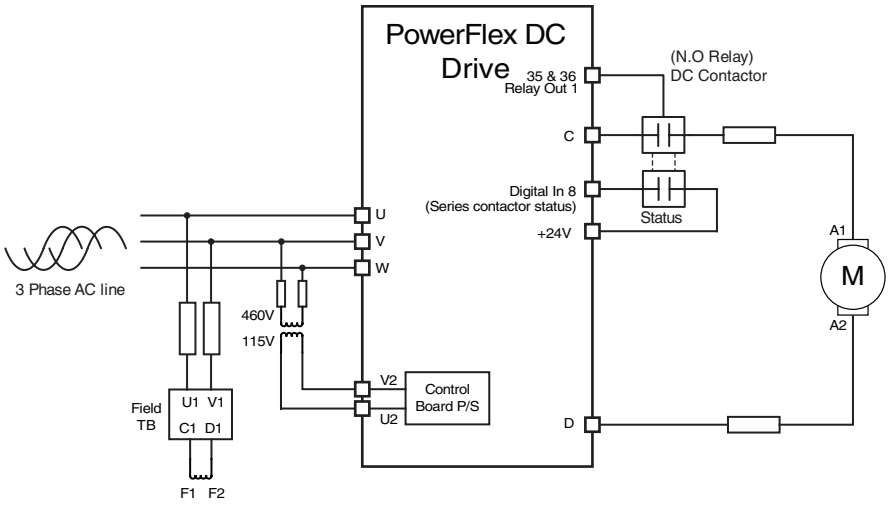
Power Wiring with AC Input Contactor



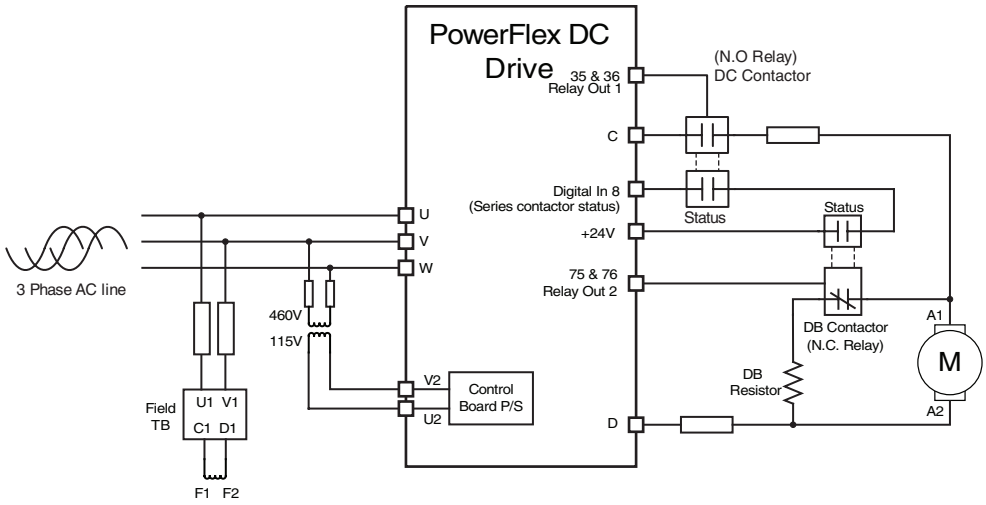
Power Wiring with AC Input Contactor and a Dynamic Brake



Power Wiring with DC Output Contactor



Power Wiring with DC Output Contactor and a Dynamic Brake

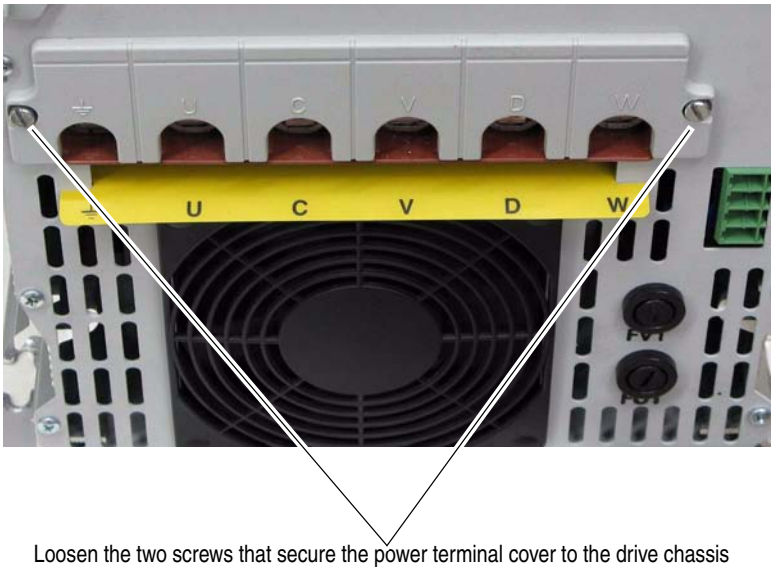


Armature Power Terminal Connections

Terminal	Description
U	Three-phase AC input power to the armature converter.
V	
W	
C	Output power from the armature to the motor.
D	

Frame A Armature Terminal Block Locations

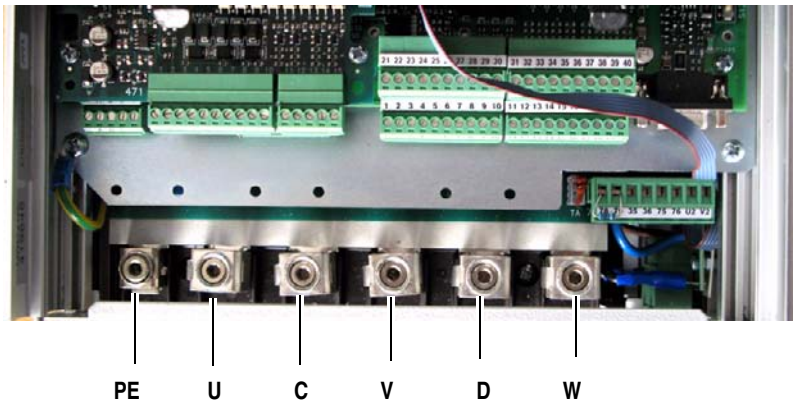
Bottom View



Loosen the two screws that secure the power terminal cover to the drive chassis and remove the terminal cover in order to connect the armature power wiring.

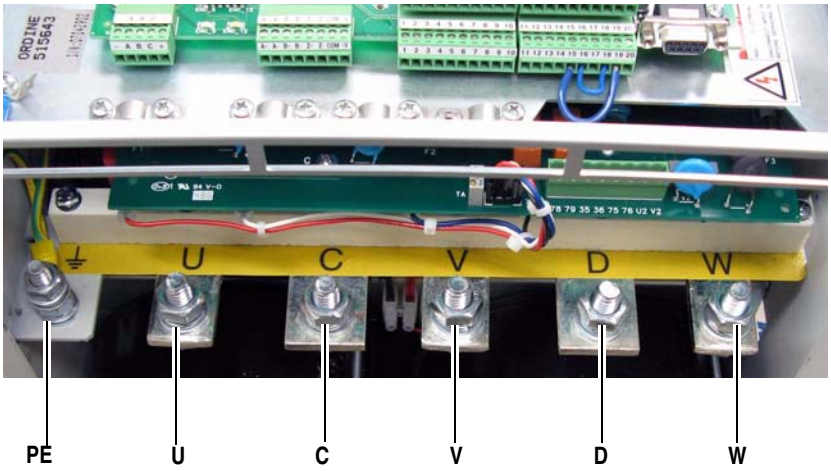
Front View

Note: Front view of drive shown with bottom protective and power terminal covers removed.



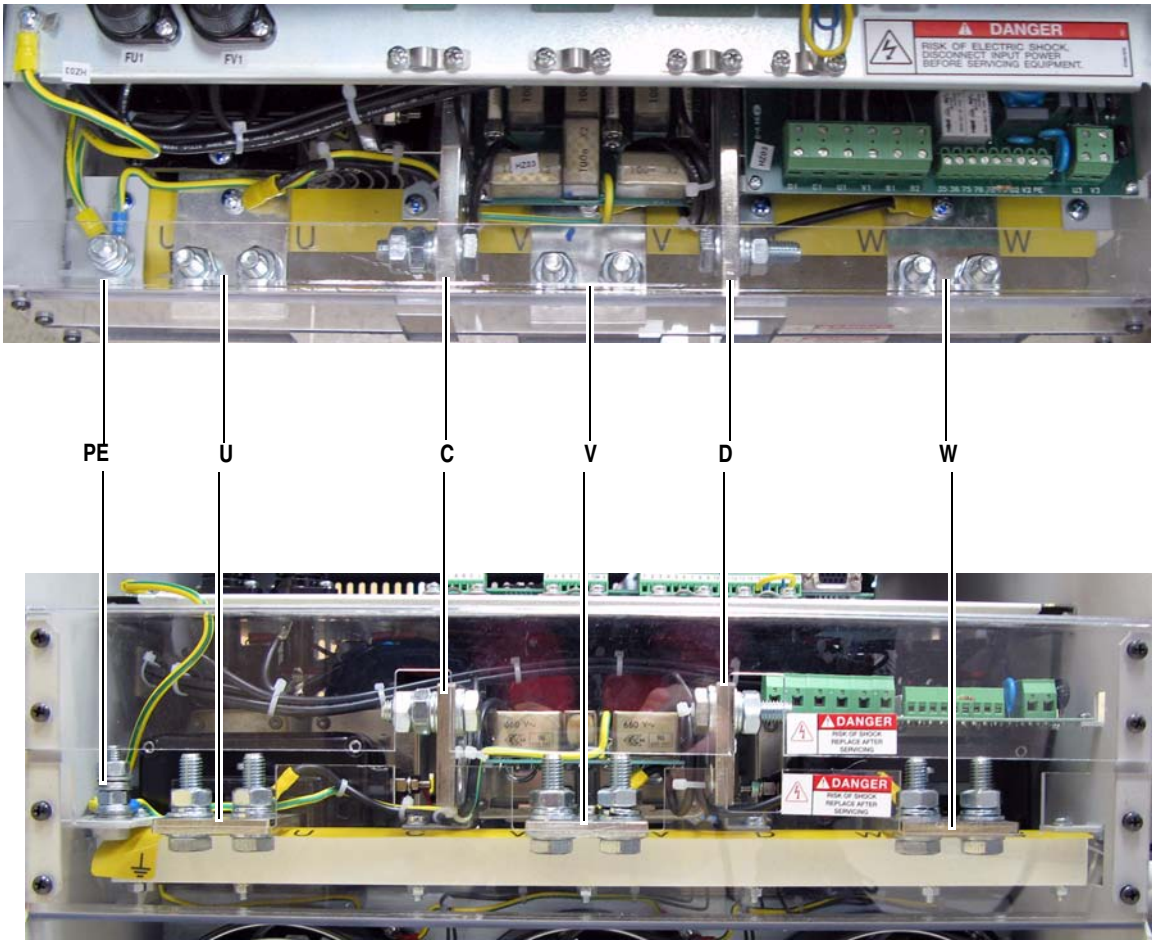
ATTENTION: Do not operate the drive with the power terminal cover removed. Operating the drive with the power terminal cover removed may result in a hazardous condition that could cause personal injury and/or equipment damage.

Frame B Armature Terminal Block Locations



Frame C Armature Terminal Block Locations

Front View



Bottom View

Armature Power Terminal and Ground (PE) Wire Sizes

Frame	Drive w/Current Code		Terminals	Wire Size (AWG/kcmils)	Terminal Bolt Size (mm)	Tightening Torque (N-m / lbs.-in.)
	230V	460V				
A	7P0	4P1	U, V, W, C, D, PE	10	5	6 / 53
	9P0	6P0				
	012	010				
	020	014				
	–	019				
	029	027	U, V, W, C, D, PE	8	5	6 / 53
	038	035	U, V, W, C, D, PE	4	5	6 / 53
	055	045				
	–	052				
	073	073	U, V, W, C, D	1/0	Terminal Block	12 / 106
			PE	2		
	093	086	U, V, W, C, D	1/0	Terminal Block	12 / 106
			PE	2		
	110	–	U, V, W, C, D	1/0	Terminal Block	12 / 106
			PE	2		
	–	100	U, V, W	3/0	Terminal Block	12 / 106
			C, D	4/0 (kit required)		
			PE	2		
	–	129	U, V, W	3/0	Terminal Block	12 / 106
			C, D	4/0 (kit required)		
			PE	2		
B	146	167	U, V, W, C, D	2 x 2/0	10	50 / 442.5
			PE	2/0	8	25 / 221
	180	–	U, V, W, C, D	2 x 2/0	10	50 / 442.5
			PE	2/0	8	25 / 221
	218	207	U, V, W, C, D	2 x 4/0	10	50 / 442.5
			PE	2/0	8	25 / 221
	265	250	U, V, W	2 x 4/0	10	50 / 442.5
			C, D	2 x 300		
			PE	2/0	8	25 / 221
	–	330	U, V, W	2 x 300 (kit required)	10	50 / 442.5
			C, D	2 x 350 (kit required)		
			PE	2/0	8	25 / 221
	360	412	U, V, W	2 x 500 (kit required)	10	50 / 442.5
			C, D	2 x 600 (kit required)		
			PE	2/0	8	25 / 221
	434	–	U, V, W	2 x 500 (kit required)	10	50 / 442.5
			C, D	2 x 600 (kit required)		
			PE	2/0	8	25 / 221
C	521	495	U, V, W	4 x 4/0	10	50 / 442.5
			C, D	4 x 250		
			PE	2/0	8	25 / 221
	–	667	U, V, W	4 x 300 (kit required)	10	50 / 442.5
			C, D	4 x 350 (kit required)		
			PE	2/0	8	25 / 221

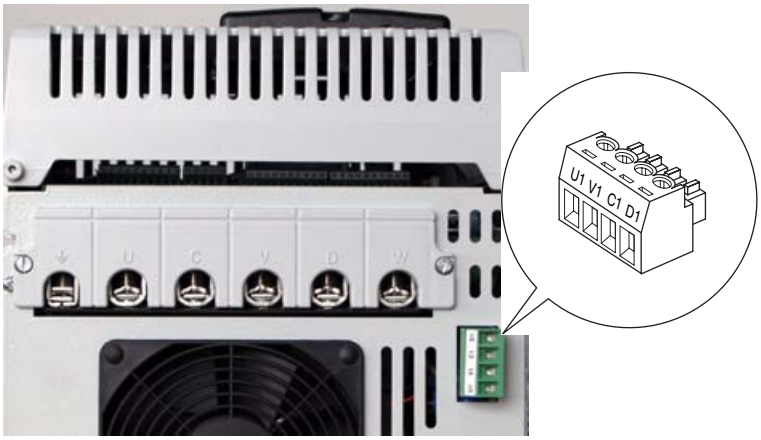
Field Converter Connections

Field Converter Terminal Designations

Terminal	Description
U1	Single-phase AC line input power to the field circuit.
V1	
C1	DC output power to the motor field.
D1	

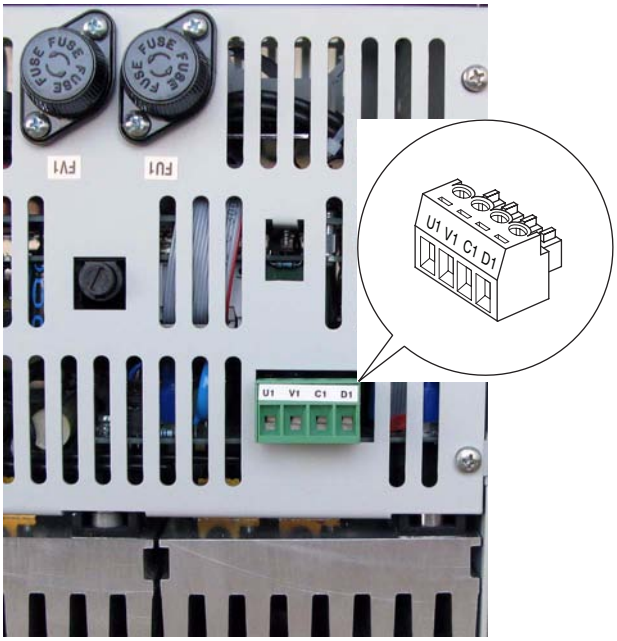
Frame A Field Circuit Terminal Block Location

Bottom View

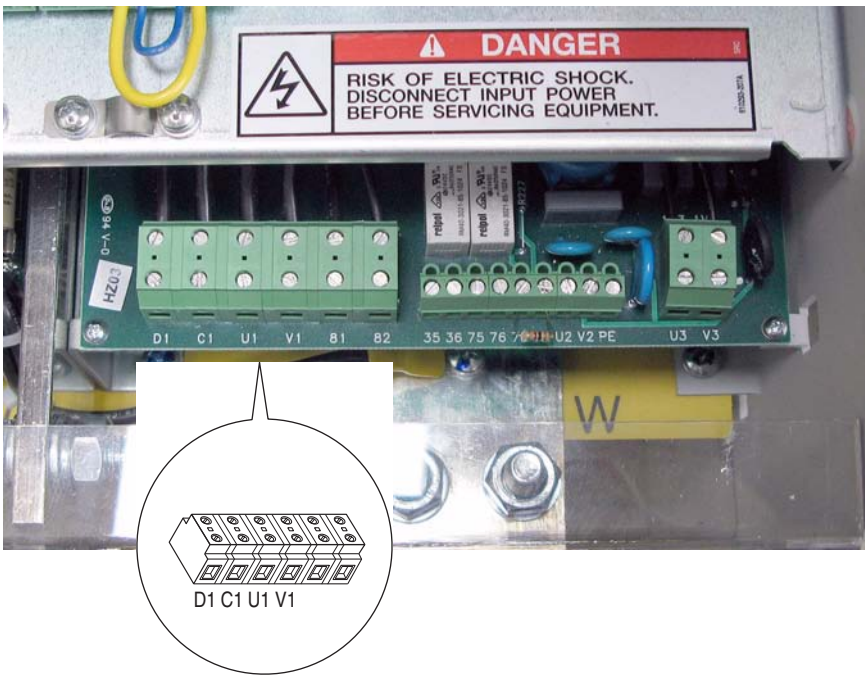


Frame B Field Circuit Terminal Block Location

Top of drive



Frame C Field Circuit Terminal Block Location


DANGER
RISK OF ELECTRIC SHOCK.
DISCONNECT INPUT POWER
BEFORE SERVICING EQUIPMENT.
D1 C1 U1 V1 81 82 35 36 75 76 U2 V2 PE U3 V3
W
D1 C1 U1 V1

Field Converter Wire Sizes

Frame	Drive w/Current Code 230V	460V	Terminals	Wire Size (AWG/kcmils)	Tightening Torque (N-m / lbs.-in.)
All	All	All	U1, V1, C1, D1	0.2 - 4.0 / 24 - 10	0.5 - 0.8 / 4.4 - 7.1

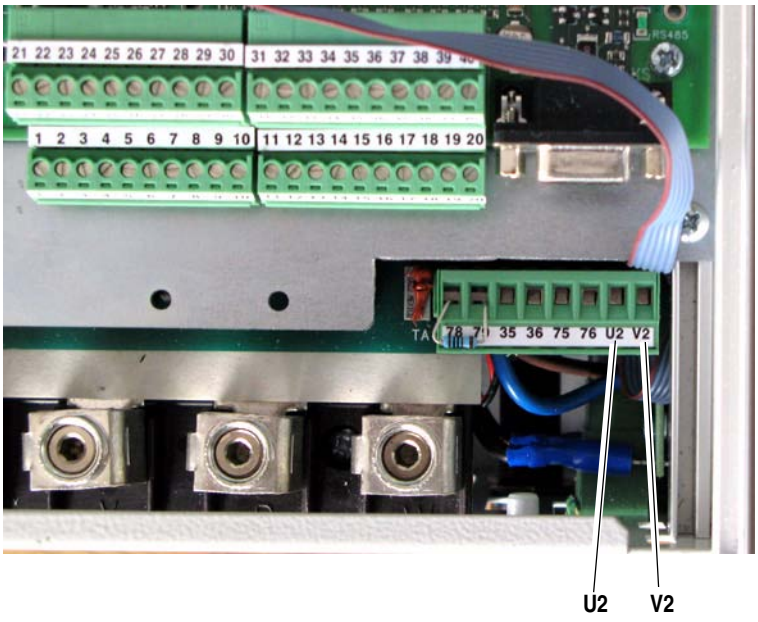
Control Circuit Input Power

The control circuit must be powered by an external 230V AC or 115V AC single phase power supply. For frame B and C drives only, a jumper is required between terminals SA and SB for 115V AC control input power. Refer to SA-SB Terminal Block Location on Frame B Drives on page 24 and SA-SB Terminal Block Location on Frame C Drives on page 25 for terminal block locations.)

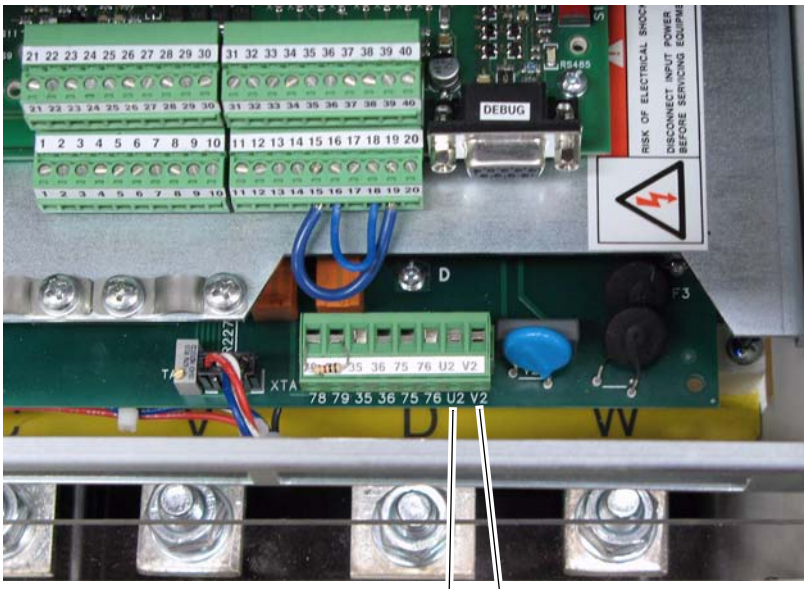
Control Circuit Terminal Designations

Terminal	Description
U2	Single-phase AC power for the control circuits.
V2	

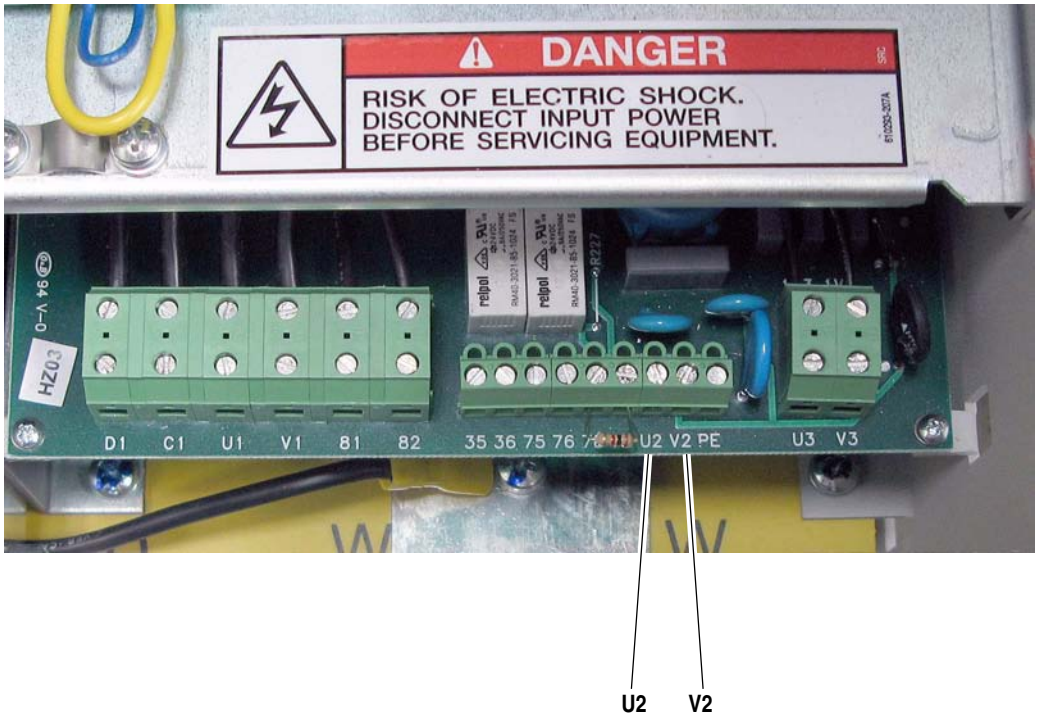
Frame A Control Circuit Terminal Block Location



Frame B Control Circuit Terminal Block Location



Frame C Control Circuit Terminal Block Location

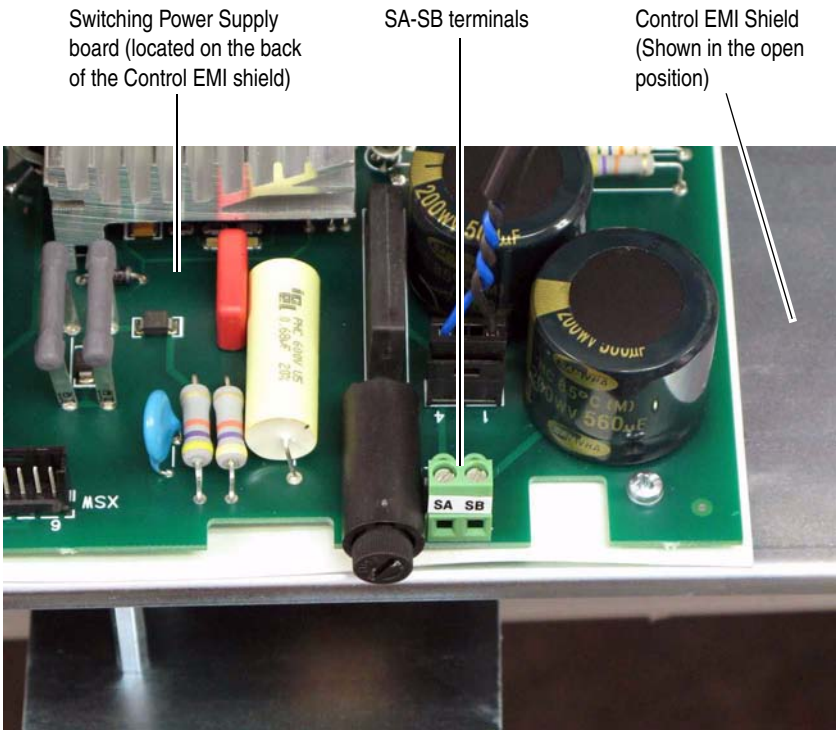

DANGER
RISK OF ELECTRIC SHOCK.
DISCONNECT INPUT POWER
BEFORE SERVICING EQUIPMENT.
D1 C1 U1 V1 81 82 35 36 75 76 U2 V2 PE U3 V3
U2
V2

Control Circuit Wire Sizes

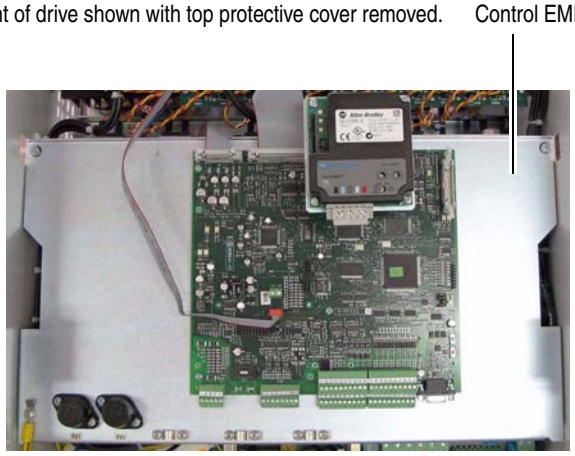
Frame	Drive w/Current Code 230V	Drive w/Current Code 460V	Terminals	Flexible Wire Size (mm^2)	Multi-core Wire Size (mm^2)	AWG	Tightening Torque (N-m / lbs.-in.)
All	All	All	U2, V2	0.14 - 1.5	0.14 - 2.5	26 - 14	0.5 / 4.4

SA-SB Terminal Block Location on Frame B Drives

SA-SB Terminal Block Location on Frame C Drives


Switching Power Supply board (located on the back of the Control EMI shield)
SA-SB terminals
Control EMI Shield (Shown in the open position)
MSX
SA SB

Front of drive shown with top protective cover removed.



Frame C Cooling Fans and Internal Fuse Signal Terminals

PowerFlex DC Frame C drives require an external power supply for the heatsink cooling fans and include internal armature circuit protection fuses (drives rated 521A @ 230V AC and 495A and 667A @ 460V AC input only). The terminals for the internal fuses can be used to indicate that the fuses have opened.

Heatsink Fans and Fuses Terminal Designations

Terminal	Description	Maximum Voltage	Maximum Current
U3	Single-phase AC input power to cooling fans (frame C drives only).	240V AC	1A
V3			
81	Internal fuse signal (frame C drives only).	250V AC	1A AC112
82			

Frame C Heatsink Cooling Fan and Internal Fuse Signal Terminal Block Locations

Relay Outputs

Terminals 35 and 36 and 75 and 76 are N.O. relay outputs. The relay output between terminals 35 and 36 is configured with parameter 1392 [Relay Out 1 Sel]. The relay output between terminals 75 and 76 is configured with parameter 629 [Relay Out 2 Sel].

Thermistors and Thermal Switches

To detect motor overheating and protect the motor from overloading, an external, user-supplied thermistor (PTC) or thermal switch must be connected to terminals 78 and 79. The drive's response to a motor over temperature fault is configured in parameter 365 [OverTemp Flt Cfg]. If a temperature sensor is not used, a 1k ohm resistor must be connected between terminals 78 and 79 (installed at the factory). Follow the appropriate instructions below when installing a thermal sensor.

Thermistors (PTC)

PTC thermistors according to DIN 44081 or 44082 fitted in the motor can be connected directly to the drive via terminals 78 and 79. In this case the 1k ohm resistor is not required between terminals 78 and 79.

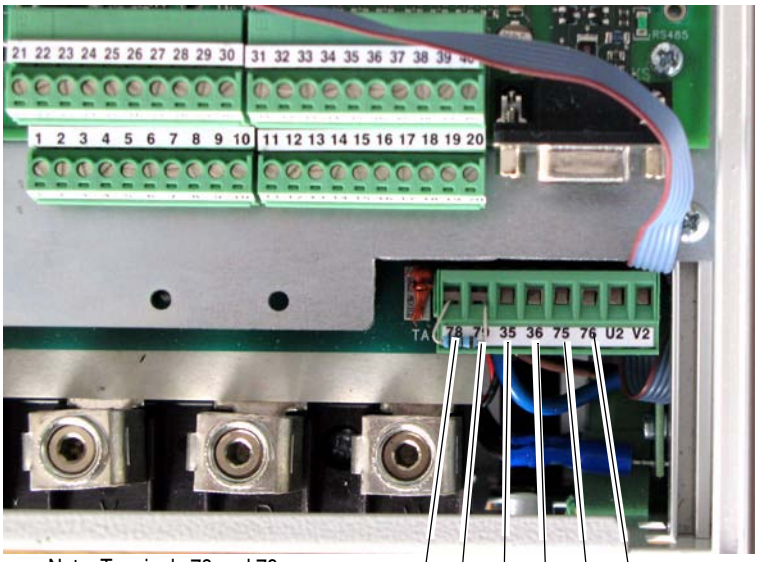
Thermal Switches (Klixon®) in the Motor Windings

"Klixon" type temperature-dependent contacts can disconnect the drive from the motor via the external control or can be configured as an external fault using a digital input on drive. They can also be connected to terminals 78 and 79 in order to have a specific error signal. If a thermal switch is used the 1k ohm resistor is not required between terminals 78 and 79.

Contact Relay and Thermistor Terminal Designations

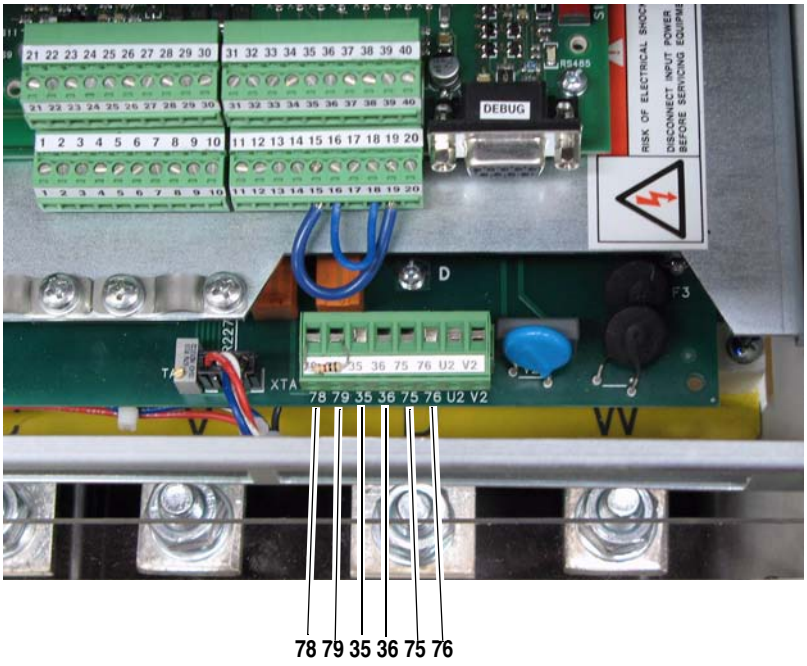
Terminal	Description
35	Normally open contact. Configured with parameter 1392 [Relay Out 1 Sel] - set to 36 "Contactor" by default.
36	
75	Normally open contact. Configured with parameter 629 [Relay Out 2 Sel] - set to 5 "Ready" by default.
76	
78	Motor thermistor connections (PTC)
79	

Frame A Contact Relay and Thermistor Terminal Block Locations

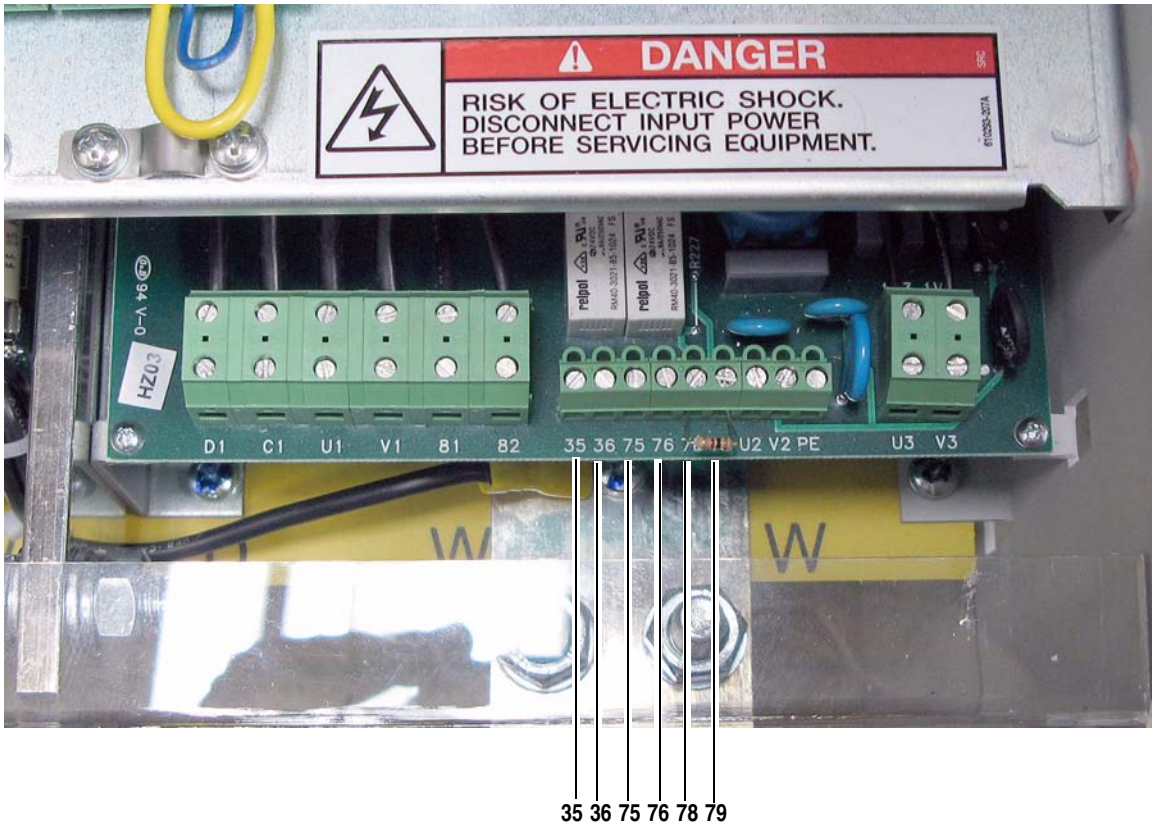


Note: Terminals 78 and 79 shown with 1k ohm resistor in place of temperature sensor.

Frame B Contact Relay and Thermistor Terminal Block Locations



Frame C Contact Relay and Thermistor Terminal Block Locations


DANGER
RISK OF ELECTRIC SHOCK.
DISCONNECT INPUT POWER
BEFORE SERVICING EQUIPMENT.
D1 C1 U1 V1 81 82 35 36 75 76 U2 V2 PE U3 V3
35 36 75 76 78 79

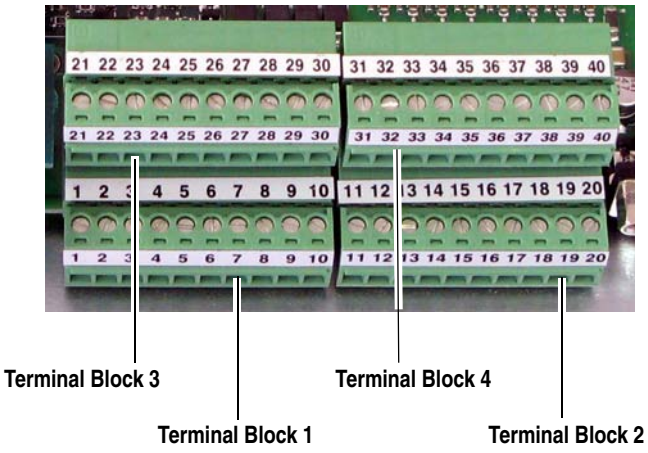
Recommended **Signal W**ire Size for Relay Outputs and Thermistor/Thermal Switch Terminals

Signal Type	Terminals	Wire Type and Size			Tightening Torque N-m (lb.-in.)
		Flexible (mm^2)	multi-core (mm^2)	AWG	
Relay Outputs	35 & 36, 75 & 76	0.140 - 1.500	0.140 - 1.500	26-14	0.5 (4.4)
Thermistor and Thermal Switches	78 & 79				

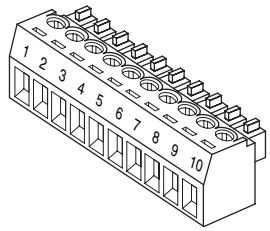
I/O Signal and Control Wiring

All I/O terminal blocks are located on the control board.

I/O Terminal Block Locations



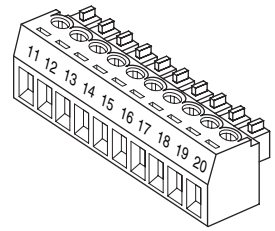
I/O Terminal Block 1 Designations



No.	Signal	Description	Factory Default	Related Parameter
1	Analog Input 1 (+)	Isolated(1), bipolar, differential, ±10V / 0-20mA, or 4-20mA. **Important:** 0-20mA or 4-20mA operation requires that switch S9, S10, and S11 on the Control board be in the "Off" position. Drive damage may occur if the switch is not in the correct position based on the type of input signal. Refer to "DIP Switch and Jumper Settings" in the *PowerFlex Digital DC Drive User Manual*, publication 20P-UM001… Max ±10V, Max 0.25mA.	1 "Speed Ref A"	70 [Anlg In1 Sel]
2	Analog Input 1 (–)			
3	Analog Input 2 (+)		0 "Off"	75 [Anlg In2 Sel]
4	Analog Input 2 (–)			
5	Analog Input 3 (+)		0 "Off"	80 [Anlg In3 Sel]
6	Analog Input 3 (–)			
7	+10V Pot Reference	2-5k ohm load. Max ±10V, Max 10mA.	–	–
8	–10V Pot Reference			
9	Pot Common	For (+) and (–) 10V pot references.	–	–
10	PE ground	PE ground to drive chassis.	–	–

(1) Differential Isolation - External source must be maintained at less than 160V with respect to PE. Input provides high common mode immunity.

I/O Terminal Block 2 Designations

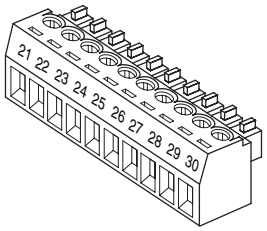


No.	Signal	Description	Factory Default	Related Parameter
11	Internal 0V		–	–
12	Digital Input 1	Max Volt. +30V, Max Cur. 15V/3.2mA, 24V/5mA, and 30V/6.4mA.	2 "Stop/CF"	133 [Digital In1 Sel]
13	Digital Input 2		3 "Start"	134 [Digital In2 Sel]
14	Digital Input 3		11 "Jog"	135 [Digital In3 Sel]
15	Digital Input 4		1 "Enable"(1)	136 [Digital In4 Sel]
16	Digital Input Common(2)		–	–
17	Not Used		–	–
18	24V Supply Common	Common for the internal power supply.	–	–
19	+24V DC Supply	Drive supplied control input power. Max. +20-30V, 200mA(3)	–	–
20	PE ground	PE ground to drive chassis.	–	–

(1) A digital input (1-8) must be configured for "Enable".
(2) When using the internal +24V DC supply (terminal 19) for digital inputs 1-4, you must connect the digital input common (terminal 16) to the +24V supply common (terminal 18).

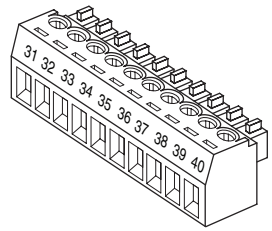
(3) The total current draw is the sum of encoder power, digital outputs and any other loads connected to terminal 19.

I/O Terminal Block 3 Designations



No.	Signal	Description	Factory Default	Related Parameter
21	Analog Output 1 (+)	Max. ±10V, Max. 5 mA.	12 "Motor Speed"	66 [Anlg Out1 Sel]
22	Analog Output 1 (–)			
23	Analog Output 2 (+)		13 "Motor Curr"	67 [Anlg Out2 Sel]
24	Analog Output 2 (–)			
25	Digital Output Common		–	–
26	Digital Output 1	Max. +30V, Max 50mA	5 "Ready"	145 [Digital Out1 Sel]
27	Digital Output 2		9 "Fault"	146 [Digital Out2 Sel]
28	Digital Output 3		2 "Spd Thresh"	147 [Digital Out3 Sel]
29	Digital Output 4		4 "CurrentLimit"	148 [Digital Out4 Sel]
30	+24V DC	Drive supplied power for Digital Outputs. Max. +30V, Max. 80mA.	–	–

I/O Terminal Block 4 Designations



No.	Signal	Description	Factory Default	Related Parameter
31	Digital Input 5	Max Volt. +30V, Max Cur. 15V/3.2mA, 24V/5mA, and 30V/6.4mA.	17 "Speed Sel 1"	137 [Digital In5 Sel]
32	Digital Input 6		18 "Speed Sel 2"	138 [Digital In6 Sel]
33	Digital Input 7		19 "Speed Sel 3"	139 [Digital In7 Sel]
34	Digital Input 8		31 "Contactor"	140 [Digital In8 Sel]
35	Digital Input Common(1)		–	–
36-40	Not Used		–	–

(1) When using the internal +24V DC supply (terminal 19) for digital inputs 5-8, you must connect the digital input common (terminal 35) to the +24V supply common (terminal 18).

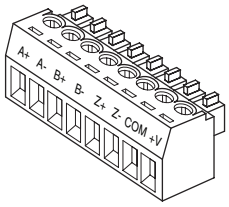
Recommended Signal Wire Size for Analog I/O and Digital I/O

Signal Type	Terminal Block (Terminals)	Wire Type and Size			Tightening Torque N-m (lb.-in.)
		Flexible (mm^2)	multi-core (mm^2)	AWG	
Analog and Digital I/O	TB1 - 4 (1 - 40)	0.140 - 1.500	0.140 - 1.500	26-16	0.4 (3.5)

Digital Encoder Terminal Block

The encoder connection cables should always be connected directly to the terminals on the encoder terminal block. The encoder cable must be made up of twisted pairs with the shield connected to the shield ground on the drive side. Do not connect the shield to ground on the motor side. In some cases (i.e., cable lengths that exceed 100 meters), it may be necessary to ground the shield of each twisted pair on the power supply. Refer to Appendix A of the *PowerFlex DC Drive User Manual*, publication 20P-UM001…, for Digital Encoder specifications.

Digital Encoder Terminal Designations

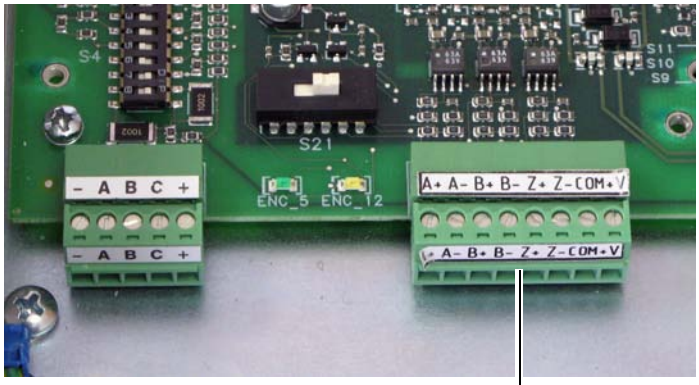


No.	Description	
A+	Encoder A	Single channel or quadrature A input
A-	Encoder A (NOT)	
B+	Encoder B	Dual channel quadrature B input
B-	Encoder B (NOT)	
Z+	Encoder Z	Pulse, marker or registration input(2)
Z-	Encoder Z (NOT)	
COM	+5/12-15V(1) DC Return	Internal power common
+V	+5/12-15V(1) DC Power	Internal power source 200 mA

(1) Selectable via switch S21 on the Control board. Refer to "DIP Switch and Jumper Settings" in the *PowerFlex DC Drive User Manual*, publication 20P-UM001…, for more information.

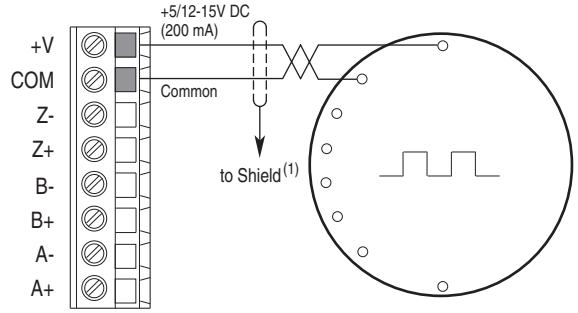
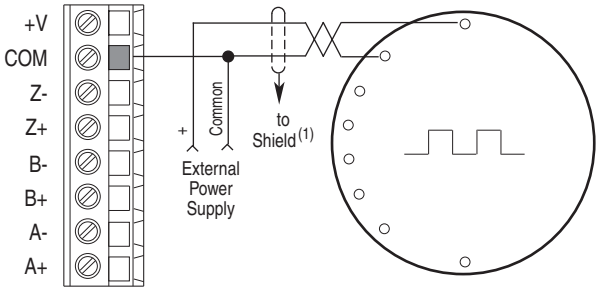
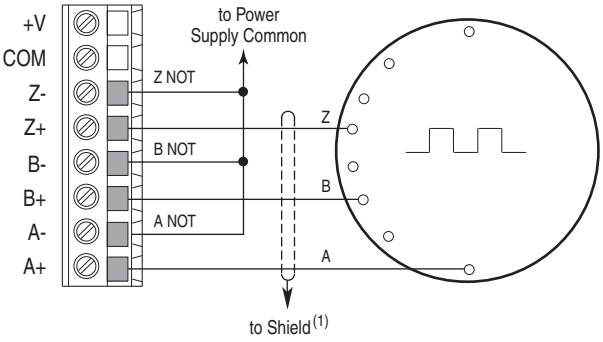
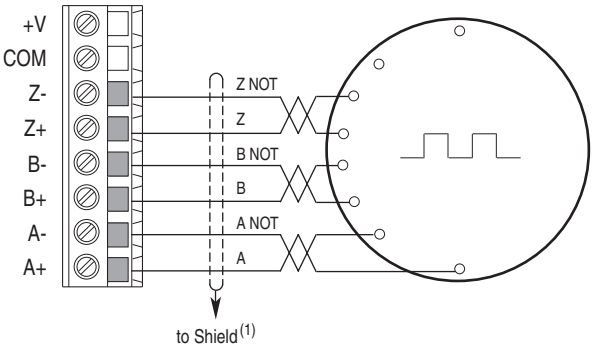
(2) Selectable via switch S20 on the Control board. Refer to "DIP Switch and Jumper Settings" in the *PowerFlex DC Drive User Manual*, publication 20P-UM001…, for more information.

Digital Encoder Terminal Block Location



Digital Encoder terminal block

Sample Encoder Wiring

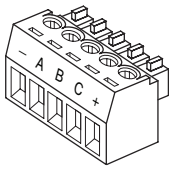
I/O	Connection Example
Encoder Power – (1) Internal Drive Power Internal (drive) +5/12-15V DC, 200mA	
Encoder Power –External Power Source	
Encoder Signal –Single-Ended, Dual Channel	
Encoder Signal –Differential, Dual Channel	

(1) Shield connection is on the drive Control EMI Shield. Refer to Digital Encoder Terminal Block Location on page 32.

DC Analog Tachometer Terminal Block

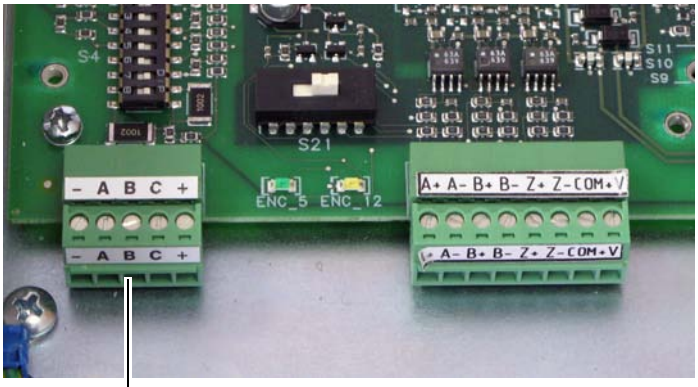
ATTENTION: The Drive can overspeed if DIP switch S4 is set incorrectly, or the tachometer is wired incorrectly. Failure to observe this precaution could result in damage to, or destruction of, the equipment.

DC Analog Tachometer Terminal Designations

	No.	Signal	Description
	–	Negative input	–
	A	(Not Used)	
	B		
	C		
	+	Positive input Clockwise rotation = positive Counterclockwise rotation = negative	22.7 / 45.4 / 90.7 / 181.6 / 302.9V(1) max voltage 8 mA max. current

(1) Maximum voltage depends on the configuration of DIP switch S4. Refer to the *PowerFlex® DC Digital Drive User Manual*, publication 20P-UM001… for information on jumper settings.

Analog Tachometer Terminal Block Location



Analog Tachometer terminal block

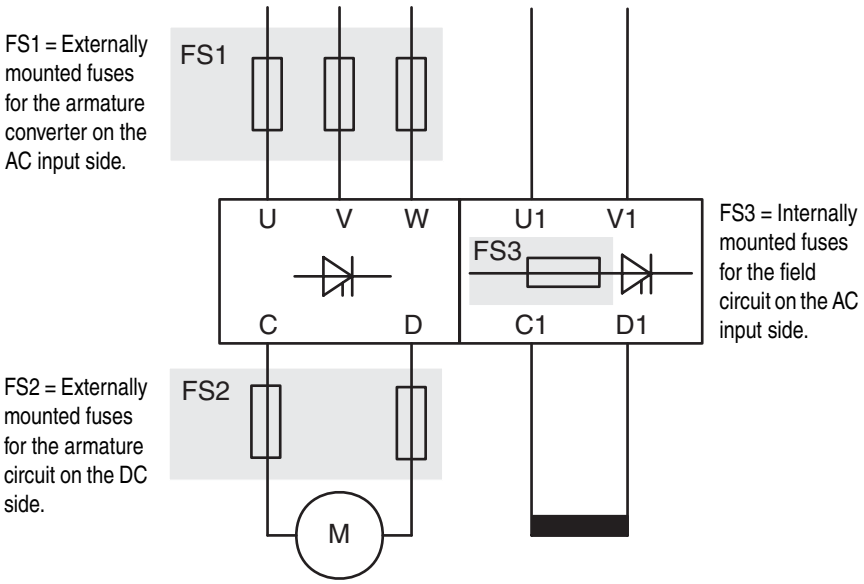
Recommended Signal Wire Size for DC Analog Tachometer

Signal Type	Terminal Block (Terminals)	Wire Type and Size			Tightening Torque N-m (lb.-in.)
		Flexible (mm^2)	multi-core (mm^2)	AWG	
DC Analog Tach	M3 (+ and –)	0.140 - 1.500	0.140 - 1.500	26-16	0.4 (3.5)

Circuit Protection

The tables on the following pages provide drive ratings and the recommended fuses for protecting the armature and field circuits. Externally mounted fuses (as indicated in the figures below) must be sourced separately when installing the drive. Internally mounted fuses are provided with the drive.

Frame A and B Fuse Designations



230V AC Input Frame A and B - Recommended Armature AC Input Line Fuses

Frame	Drive Current Rating Code	DC Amps	AC Line Amps	Fuse Code FS1 (See Frame A and B Fuse Designations on page 35)					
				Bussmann				Ferraz Shawmut (Gould Shawmut)	
				Ferrule FWP Type	Ferrule Fuse Block	North American FWP Type	North American Fuse Block	Ferrule A70QS Type	North American A70P / A70QS Type
A	7P0	7	5.7	FWP-10A14F	CH143D	FWP-10B		A70QS10-14F	A70P10-4
	9P0	9	7.4	FWP-15A14F		FWP-15B		A70QS16-14F	A70P15-4
	012	12	9.8	FWP-20A14F		FWP-20B		A70QS20-14F	A70P20-4
	020	20	16	FWP-32A14F		FWP-35B		A70QS32-14F	A70QS35-4
	029	29	24	FWP-50A22F	CH223D	FWP-50B		A70QS50-22F	A70QS50-4
	038	38	31	FWP-63A22F		FWP-60B		A70QS63-22F	A70QS60-4
	055	55	45	FWP-100A22F		FWP-90B		A70QS100-22F	A70QS90-4
	073	73	60			FWP-125A	ST14		A70QS125-4K
	093	93	76			FWP-150A			A70QS150-4K
	110	110	90			FWP-175A			A70QS175-4K
B	146	146	119			FWP-250A			A70QS250-4
	180	180	147			FWP-300A			A70QS300-4
	218	218	178			FWP-350A			A70QS350-4
	265	265	217			FWP-450A	ST38-72612		A70QS450-4
	360	360	294			FWP-600A			A70QS600-4K
	434	434	355			FWP-700A			A70QS700-4

460V AC Input Frame A and B - Recommended Armature AC Input Line Fuses

Frame	Drive Current Rating Code	DC Amps	AC Line Amps	Fuse Code FS1 (See Frame A and B Fuse Designations on page 35)					
				Bussmann				Ferraz Shawmut (Gould Shawmut)	
				Ferrule FWP Type	Ferrule Fuse Block	North American FWP Type	North American Fuse Block	Ferrule A70QS Type	North American A70P / A70QS Type
A	4P1	4.1	3.3	FWP-10A14F	CH143D	FWP-10B		A70QS10-14F	A70P10-4
	6P0	6	4.9	FWP-10A14F		FWP-10B		A70QS10-14F	A70P10-4
	010	10	8.2	FWP-20A14F		FWP-20B		A70QS20-14F	A70P25-4
	014	14	11.4	FWP-25A14F		FWP-25B		A70QS25-14F	A70P25-4
	019	19	15.5	FWP-30A14F		FWP-30B		A70QS32-14F	A70P30-4
	027	37	22.1	FWP-50A22F	CH223D	FWP-50B		A70QS50-22F	A70QS50-4
	035	35	28.6	FWP-63A22F		FWP-60B		A70QS63-22F	A70QS60-4
	045	45	36.8	FWP-80A22F		FWP-80B		A70QS80-22F	A70QS80-4
	052	52	42.5	FWP-100A22F		FWP-90B		A70QS100-22F	A70QS90-4
	073	73	59.6			FWP-125A	ST14		A70QS125-4K
	086	86	70.3			FWP-150A			A70QS150-4K
	100	100	81.7			FWP-175A			A70QS175-4K
	129	129	105.4			FWP-200A			A70QS200-4K
B	167	167	136.4			FWP-300A			A70QS300-4
	207	207	169.1			FWP-350A			A70QS350-4
	250	250	204.3			FWP-400A	ST38-72612		A70QS400-4
	330	330	269.6			FWP-600A			A70QS600-4K
	412	412	336.6			FWP-700A			A70QS700-4

230V AC Input Frame A and B - Recommended Armature DC Output Fuses

Frame	Drive Current Rating Code	DC Amps	AC Line Amps	Fuse Code FS2(1) (See Frame A and B Fuse Designations on page 35)					
				Bussmann				Ferraz Shawmut (Gould Shawmut)	
				Ferrule FWP Type	Ferrule Fuse Block	North American FWP Type	North American Fuse Block	Ferrule A70QS Type	North American A70P / A70QS Type
A	7P0	7	5.7	FWP-15A14F	CH142D	FWP-15B		A70QS16-14F	A70P15-4
	9P0	9	7.4	FWP-20A14F		FWP-20B		A70QS20-14F	A70P20-4
	012	12	9.8	FWP-25A14F		FWP-25B		A70QS25-14F	A70P25-4
	020	20	16	FWP-40A14F		FWP-40B		A70QS40-14F	A70QS40-4
	029	29	24	FWP-63A22F	CH222D	FWP-60B		A70QS63-22F	A70QS60-4
	038	38	31	FWP-80A22F		FWP-80B		A70QS80-22F	A70QS80-4
	055	55	45			FWP-125A	ST14		A70QS125-4K
	073	73	60			FWP-150A			A70QS150-4K
	093	93	76			FWP-200A			A70QS200-4K
	110	110	90			FWP-225A			A70QS250-4
B	146	146	119			FWP-300A			A70QS300-4
	180	180	147			FWP-350A			A70QS350-4
	218	218	178			FWP-450A	ST38-72612		A70QS450-4
	265	265	217			FWP-600A			A70QS600-4K
	360	360	294			FWP-700A			A70QS700-4
	434	434	355			FWP-900A			A70P900-4

(1) Required on four quadrant drives only.

460V AC Input Frame A and B - Recommended Armature DC Output Fuses

Frame	Drive Current Rating Code	DC Amps	AC Line Amps	Fuse Code FS2[1] (See Frame A and B Fuse Designations on page 35)					
				Bussmann				Ferraz Shawmut (Gould Shawmut)	
				Ferrule FWP Type	Ferrule Fuse Block	North American FWP Type	North American Fuse Block	Ferrule A70QS Type	North American A70P / A70QS Type
A	4P1	4.1	3.3	FWP-10A14F	CH142D	FWP-10B		A70QS10-14F	A70P10-4
	6P0	6	4.9	FWP-15A14F		FWP-15B		A70QS16-14F	A70P15-4
	010	10	8.2	FWP-20A14F		FWP-20B		A70QS20-14F	A70P20-4
	014	14	11.4	FWP-30A14F		FWP-30B		A70QS32-14F	A70P30-4
	019	19	15.5	FWP-40A14F		FWP-40B		A70QS40-14F	A70QS40-4
	027	37	22.1	FWP-63A22F	CH222D	FWP-60B		A70QS63-22F	A70QS60-4
	035	35	28.6	FWP-80A22F		FWP-70B		A70QS80-22F	A70QS70-4
	045	45	36.8	FWP-100A22F		FWP-90B			A70QS90-4
	052	52	42.5	FWP-100A22F		FWP-100B			A70QS100-4
	073	73	59.6			FWP-150A	ST14		A70QS150-4K
	086	86	70.3			FWP-175A			A70QS175-4K
	100	100	81.7			FWP-200A			A70QS200-4K
	129	129	105.4			FWP-250A			A70QS250-4
B	167	167	136.4			FWP-350A			A70QS350-4
	207	207	169.1			FWP-400A			A70QS400-4
	250	250	204.3			FWP-500A	ST38-72612		A70QS500-4K
	330	330	269.6			FWP-700A			A70QS700-4
	412	412	336.6			FWP-800A			A70QS800-4

(1) Required on four quadrant drives only.

230V AC Input Frame A and B - Recommended Field AC Input Line Fuses

Frame	Drive Current Rating Code	Field Amps	Type	Fuse Code FS3 (See Frame A and B Fuse Designations on page 35)[1]	
				Bussmann	Ferraz Shawmut (Gould Shawmut)
A	7P0	10	6 x 32 mm	FWH-016A6F	E085450
	9P0				E085451
	012				E085452
	020				E085453
	029				E085454
	038				E085455
	055				E085456
	073	14			E085457
	093				E085458
	110				E085459
B	146	20	10 x 38 mm	FWC-25A10F	A60Q25-2
	180				A60Q25-3
	218				A60Q25-4
	265				A60Q25-5
	360				A60Q25-6
	434				A60Q25-7

(1) Internal fuses - provided with the drive.

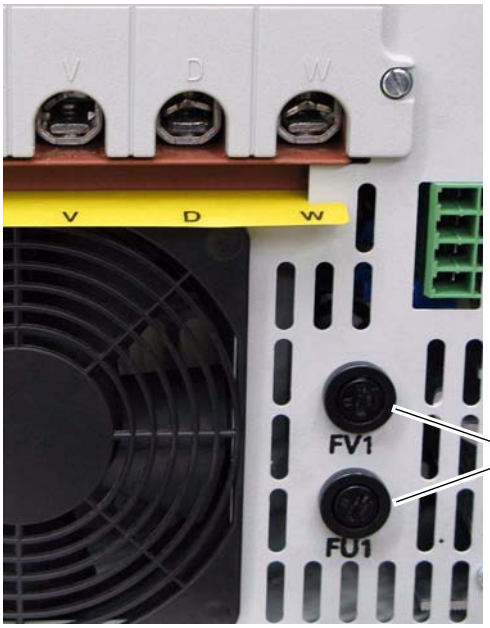
460V AC Input Frame A and B - Recommended Field AC Input Line Fuses

Frame	Drive Current Rating Code	Field Amps	Type	Fuse Code FS3 (See Frame A and B Fuse Designations on page 35)(1)	
				Bussmann	Ferraz Shawmut (Gould Shawmut)
A	4P1	10	6 x 32 mm	FWH-016A6F	E085449
	6P0				E085450
	010				E085451
	014				E085452
	019				E085453
	027				E085454
	035				E085455
	045				E085456
	052				E085457
	073	14			E085458
	086				E085459
	100				E085460
	129				E085461
B	167	20	10 x 38 mm	FWC-25A10F	A60Q25-2
	207				A60Q25-3
	250				A60Q25-4
	330				A60Q25-5
	412				A60Q25-6

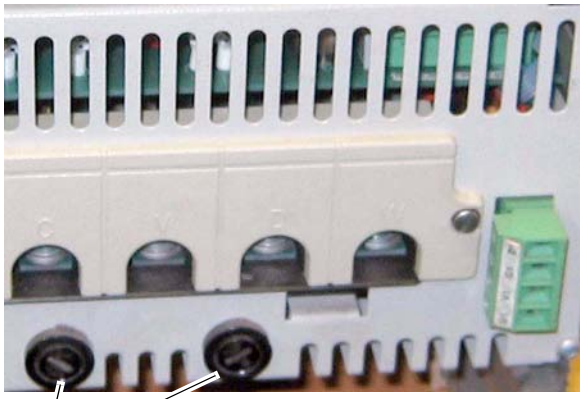
(1) Internal fuses - provided with the drive.

Figure 1.1 Frame A Field AC Input Line Fuses Location

Bottom View of Drive with Fan



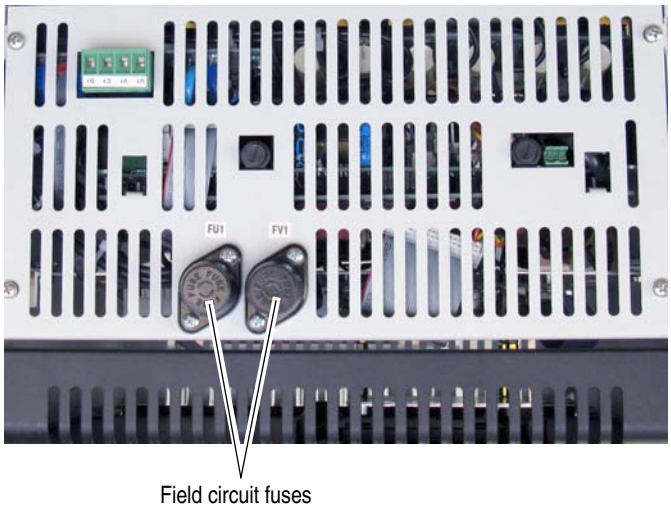
Bottom View of Drive without Fan



Field circuit fuses

Figure 1.2 Frame B Field AC Input Line Fuses Location

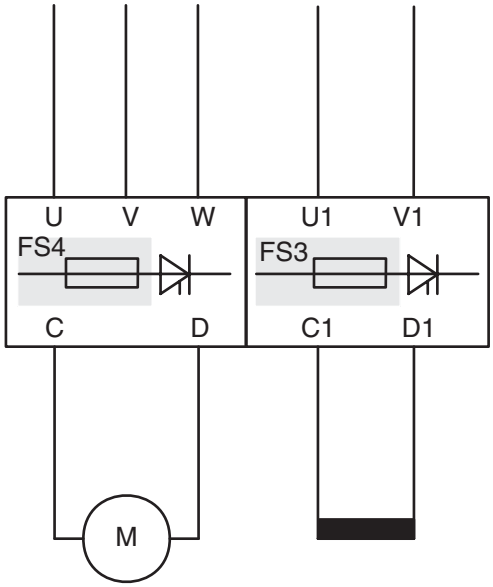
Top View of Drive



All fuses for AC input to the armature and field circuit protection are internally mounted and provided with frame C PowerFlex DC drives with 230V AC input and a current rating of 521A and 460V AC input and a current rating of 495A and 667A.

Frame C Fuse Designations

FS4 = Internally mounted fuses for the armature converter on the AC input side.



FS3 = Internally mounted fuses for the field circuit on the AC input side.

230V AC Input Frame C - Recommended Field Circuit Fuses

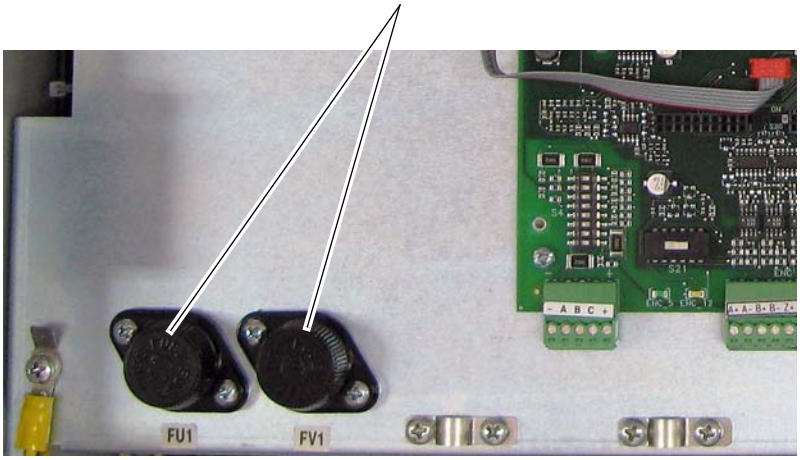
Drive Current Rating Code	Field Amps	Type	Fuse Code FS3 (See Frame C Fuse Designations on page 40)	
			Bussmann	Ferraz Shawmut (Gould Shawmut)
521	20	10 x 38 mm	FWC-25A10F	A60Q25-8

460V AC Input Frame C - Recommended Field Circuit Fuses

Drive Current Rating Code	Field Amps	Type	Fuse Code FS3 (See Frame C Fuse Designations on page 40)	
			Bussmann	Ferraz Shawmut (Gould Shawmut)
495	20	10 x 38 mm	FWC-25A10F	A60Q25-7
667				A60Q25-8

Frame C Field Circuit Fuse Location

Field AC input fuses are located on the Control EMI shield, which holds the Control board.



230V AC Input Frame C - Recommended Armature AC Input Line Fuses

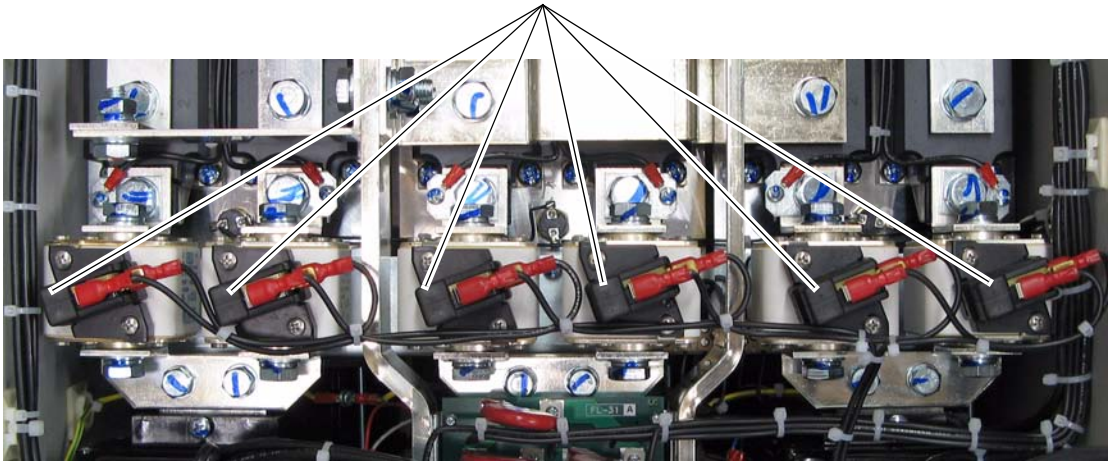
Drive Current Rating Code	DC Amps	AC Line Amps	**Fuse Code FS4** (See Frame C Fuse Designations on page 40)	
			Bussmann	**Ferraz Shawmut (Gould Shawmut)**
			Square Body - Flush End Contact	
521	521	426	170M5466 + switch 170H0069	PC32UD69V1000TF + switch MS3-V1-5BS

460V AC Input Frame C - Recommended Armature AC Input Line Fuses

Drive Current Rating Code	DC Amps	AC Line Amps	**Fuse Code FS4** (See Frame C Fuse Designations on page 40)	
			Bussmann	**Ferraz Shawmut (Gould Shawmut)**
			Square Body - Flush End Contact	
495	495	404.4	170M5464 + switch 170H0069	PC32UD69V800TF + switch MS3-V1-5BS
667	667	544.9	170M5466 + switch 170H0069	PC32UD69V1000TF + switch MS3-V1-5BS

Frame C Armature AC Input Line Fuse Location

AC Input fuses and switches are located on the bus bars behind the Control EMI shield, which holds the Control board.



Note: Drive shown with front covers removed and Control EMI shield lowered.

Control Power Circuit Protection Fuses

The following fuses are used to protect the Switching Power Supply circuit and the MOVs on the Pulse Transformer circuit board or Transient Noise Filter circuit board.

Frame	Designation	Fuses for	Fuse	Mounted on
A	F1	+ 24V	1 A, 250 V slow - 0.2"x0.8" (5x20mm)	Switching Power Supply circuit board
B and C	F1	+ 24V	3 A, 250 V slow - 0.2"x0.8" (5x20mm)	Switching Power Supply circuit board
	F2	Main section	2.5 A, 250 V fast - 0.2"x0.8" (5x20mm)	
B and C	F1/F2/F3	Varistors	4 A, 500 V fast - 0.24"x1.3" (6x32mm)	Pulse Transformer circuit board
C				Transient Noise Filter circuit board

Figure 1.3 Frame A Switching Power Supply Fuse Location

Top View of Drive

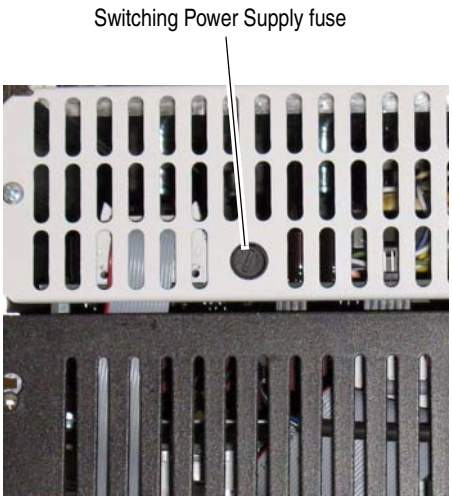


Figure 1.4 Frame B Switching Power Supply Fuse Location

Top View of Drive

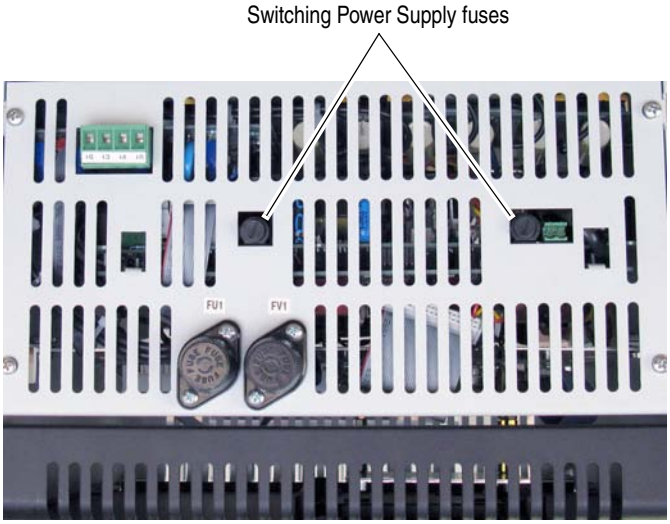


Figure 1.5 Frame C Switching Power Supply Fuse Location

Fuses are located on the Switching Power Supply circuit board (SW-2) on the back of the Control EMI shield, which holds the Control board.

Mounting

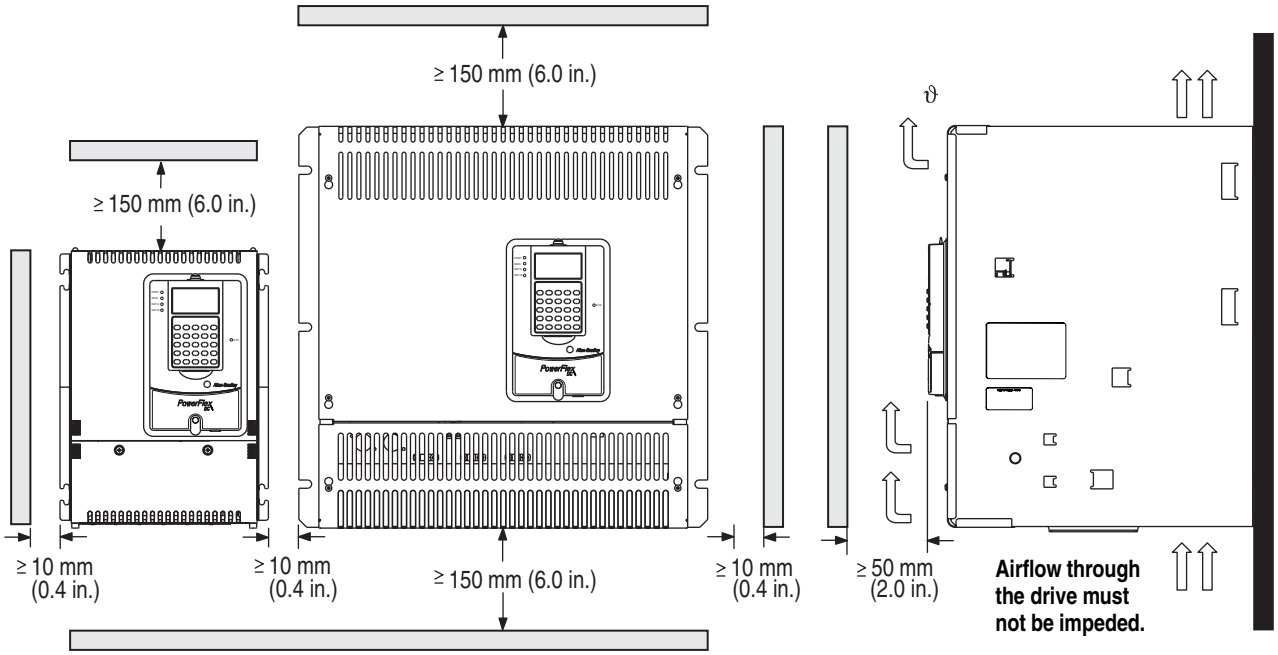
Operating Conditions and Temperatures

PowerFlex DC drives are designed to operate at 0° to 50° C surrounding air temperature without derating. The drive must be mounted in a clean, dry location. Contaminants such as oils, corrosive vapors and abrasive debris must be kept out of the enclosure. NEMA/UL Type Open, IP20 enclosures are intended for indoor use primarily to provide a degree of protection against contact with enclosed equipment. These enclosures offer no protection against airborne contaminants.

Minimum Mounting Clearances

Minimum clearance requirements (indicated in Drive Enclosure Minimum Mounting Clearances on page 44) are intended to be from drive to drive. Other objects can occupy this space; however, reduced airflow may cause protection circuits to fault the drive. The drive must be mounted in a vertical orientation as shown below and must not be mounted at an angle greater than 30° from vertical. In addition, inlet air temperature must not exceed the product specification.

Drive Enclosure Minimum Mounting Clearances

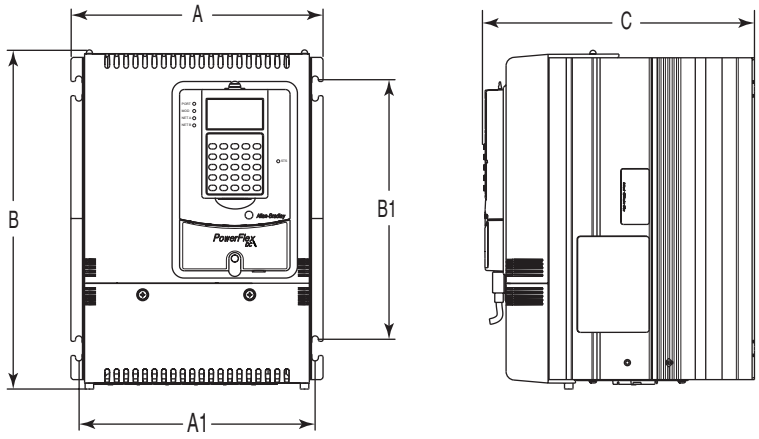


Important: Verify that all mounting screws are properly tightened before and after operation.

Approximate Dimensions

Frame A Dimensions

A	B	C	A1	B1	Ø
mm (in.)	mm (in.)	mm (in.)	mm (in.)	mm (in.)	
267 (10.5)	359 (14.0)	287 (11.3)	250 (9.8)	275 (10.8)	M6

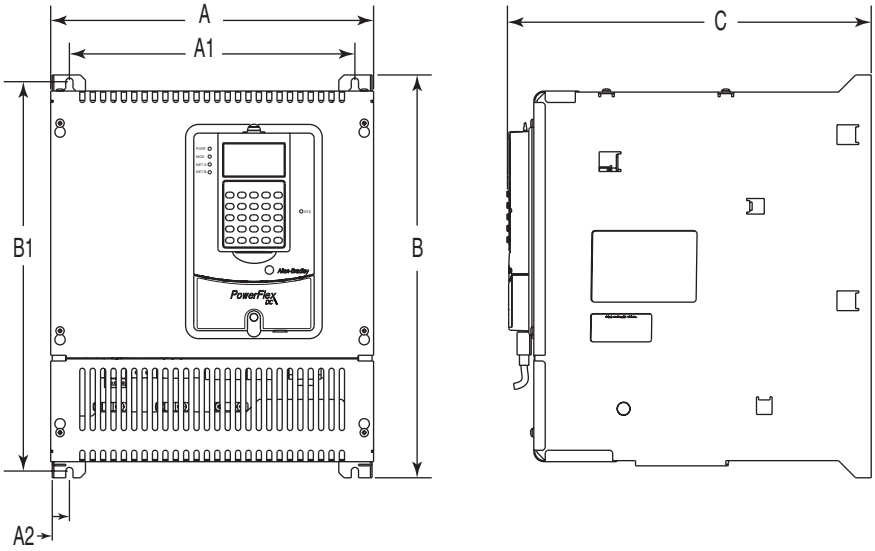


Frame A Weights

Drive w/ND Rating Code		Weight	
		Drive	Drive & Packaging
230V	460V	kg (lbs.)	kg (lbs.)
7P0	4P1	8.4 (19.5)	10.5 (23.1)
9P0	6P0		
012	010		
020	014		
–	019		
029	027		
038	035	8.8 (19.4)	11 (24.3)
055	045		
–	052		
073	073	10.8 (23.8)	13 (28.7)
093	086		
110	–		
–	100		
–	129		

Frame B Dimensions

A	A1	A2	B	B1	C	Ø
mm (in.)	mm (in.)	mm (in.)	mm (in.)	mm (in.)	mm (in.)	
311 (12.2)	275 (10.8)	16.5 (0.65)	388 (15.3)	375 (14.8)	350 (13.8)	M6

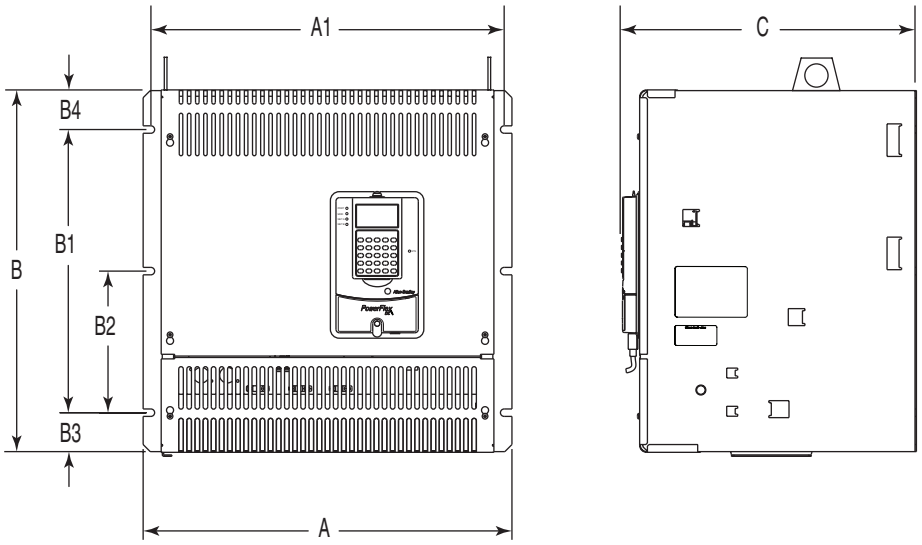


Frame B Weights

Drive w/ND Rating Code		Weight	
		Drive	Drive & Packaging
230V	460V	kg (lbs.)	kg (lbs.)
146	167	25.5 (56.2)	27.5 (60.6)
180	–		
218	207		
265	250	29.5 (65.0)	31.5 (69.4)
360	330	32 (70.5)	34 (75)
434	412		

Frame C Dimensions

A	A1	B	B1	B2	B3	B4	C	Ø
mm (in.)	mm (in.)	mm (in.)	mm (in.)	mm (in.)	mm (in.)	mm (in.)	mm (in.)	
521 (20.5)	499 (19.7)	511 (20.1)	400 (15.7)	200 (7.9)	55 (2.2)	56 (2.2)	416 (16.4)	M6



Frame C Weights

Drive w/ND Rating Code		Weight	
		Drive	Drive & Packaging
230V	460V	kg (lbs.)	kg (lbs.)
–	495	61 (134.5)	74 (163.1)
521	667	65 (143.3)	81 (178.6)

PowerFlex DC Configured Drives

Overview

The PowerFlex DC Configured Drives allow users to create drive packages based on their specific needs. This program enhances stand-alone drive functionality through additional control, power and packaging options, which are ideal for Original Equipment Manufacturers (OEM) and end users with special installation needs. This program consists of:

- Standard Configured Drives
- Engineer To Order Configured Drives

Standard Configured Drives

The Standard Configured Drives Program allows users to create drive packages based on their specific needs. A complete drive package may be specified by assembling a single catalog number string that includes a base drive and all required options. Packaging is available for 230 and 460V ac requirements in IP20, NEMA/UL Type 1 MCC style enclosures or rigid-panel mounted for installation in an existing enclosure. The program consists of a fully defined catalog string identified within this publication. Focused on higher volume, repeat business, the standard designs provide consistent manufacturing and minimizes customer resources by reducing engineering, manufacturing and installation time. Typical delivery is 6…8 weeks from order entry and can be ordered through the order entry system.

Engineer To Order Configured Drives (ETO)

The Engineer To Order Configured Drives Program offers users the ability to create drive packages beyond the Standard Configured Drives offering. Options may or may not be defined within this publication. Products can be ordered by contacting your Global Drives Systems representative at the central office location or one of the Local Drive Solution Centers. Our engineering experts will assist in defining the specific requirements of your application.

The Standard Configured Drive designs may be modified to meet the design criteria or a complete custom package can be designed for any application. The typical lead time of an ETO order is 8…12 weeks based on the lead time and availability of unique components of the design.

Benefits

- Simplified installation and start-up by use of common options assembled at the factory.
- Drive functionality exceeds options offered with a standard drive.
- Multiple packaging options specific to customer needs.
- Pre-engineered options for easy order entry, consistent manufacturing, high quality and reduced delivery time.
- Selectable configurations to meet application requirements.

Features

- Standard PowerFlex DC Digital drives and drive-related options.
- 6 pulse and 12 pulse.
- Enclosure options: IP20 MCC, IP42 Filter, IP00 (mounted on a panel), either conformal coated circuit boards or without.
- Pre-engineered options.
- Custom/engineered solutions.
- UL panel recognition from the factory for pre-engineered options.

Factory Installed Options

Enclosure Options

The PowerFlex Configured DC drives can be ordered in a IP20, NEMA/UL Type 1 MCC style enclosure or a IP43, NEMA/UL Type 1 with Fan & Filter MCC style enclosure. For both of these enclosures the drive, incoming disconnect and any specified operator devices will be mounted and wired in the cabinet or on the door as required. If a cabinet mounted input line reactor is specified, it will be mounted in the cabinet for drives ratings of 200 Hp or less. The drive may also be ordered on a rigid panel for installation in a users existing cabinet. For these designs the drive and all panel mounted parts will be mounted and wired. The incoming disconnect, operator devices and input line reactor will be shipped loose for customer mounting and wiring per local codes.

All MCC cabinets are 2286 mm H x 635 mm D (90 in. H x 25 in. D) with the width determined by the size of the drive and the options requested. The standard width enclosures are 508, 635, 889 mm (20, 25 and 35 in.) wide. The rigid panel mount designs are shipped on a 1981 mm H x 508 mm W or 813 mm W (78 in. H x 20 in. W or 32 in. W) panel to fit a standard 610 mm W X 914 mm W (24 in. W or 36 in. W) enclosure.

Human Interface Module (HIM) Options

The PowerFlex Configured DC drives can be ordered with a variety of HIM modules to meet the needs of each drive. The HIM's are installed on the door of the enclosures or shipped loose on the Open Panel designs. All designs have the door mounted bezel and interconnect cable to the drive. HIM's can be installed or updated in the field.

No HIM (Blank Plate)
Catalog Code: 0

LCD Display, Full
Numeric Keypad
Catalog Code: C

LCD Display,
Programmer Only
Catalog Code: E

I/O Options

The PowerFlex Configured DC drive has built-in configurable digital and analog I/O. The digital I/O is 24V dc and the analog I/O can be configured for voltage or current operation. Additional 24V dc and analog I/O can be added or an I/O conversion card can be added to accommodate 115V ac digital I/O.

I/O Options	
Control	Code
I/O Expansion Card (4 Additional 24V dc Digital Inputs & Outputs, 2 Analog Outputs)	A
115V ac Conversion Card (8 Digital Inputs & Outputs)	B
8 - 24V - dc Digital Inputs & Outputs, 3 Analog Outputs and 2 Analog Inputs	N

Communication Options

The PowerFlex Configured DC drives are fully compatible with Allen-Bradley drive's wide variety of DPI communication adapters, offering the following options.

Description	Catalog No.
ControlNet™ Communication Adapter (Coax)	C
DeviceNet™ Communication Adapter	D
EtherNet/IP™ Communication Adapter	E
Interbus™ Communication Adapter	I
LonWorks™ Communication Adapter	L
PROFIBUS™ DP Communication Adapter	P
ControlNet™ Communication Adapter (Fiber)	Q
Remote I/O Communication Adapter	R
None	N

Cabinet Options

The Configured Drive enclosure can be equipped with a variety of standard user option. These options are predefined as described below. Other options can be ordered through the ETO program.

Description	Catalog No.
None	N
Start and Stop PB's	1
Local/Remote SS	2
E-Stop PB	3
Jog	4
Blower Motor Starter	5
Options 1 & 2	A
Options 1 & 3	B
Options 1 & 4	C
Options 1 - 3	D
Options 1 - 4	E
Options 1 - 5	F
Options A & 4	G
Options A & 5	H
Options B & 4	J
Options B & 5	K

Certifications

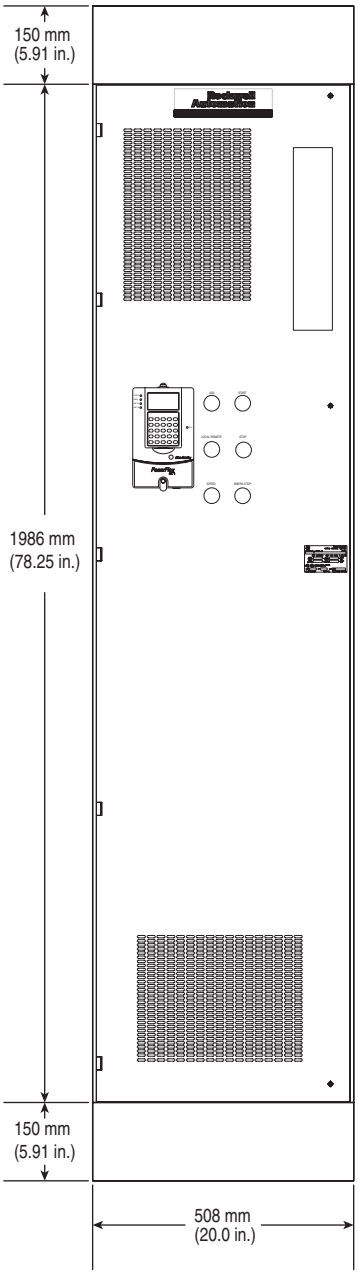
The PowerFlex DC Drive is a UL/cUL certified product. The Configured Drive enclosure can also be built to UL/cUL certification and to CSA certification.

Description	Code
None (Drive unit is UL/cUL	N
UL/cUL	1
CSA Inspection & certification	2

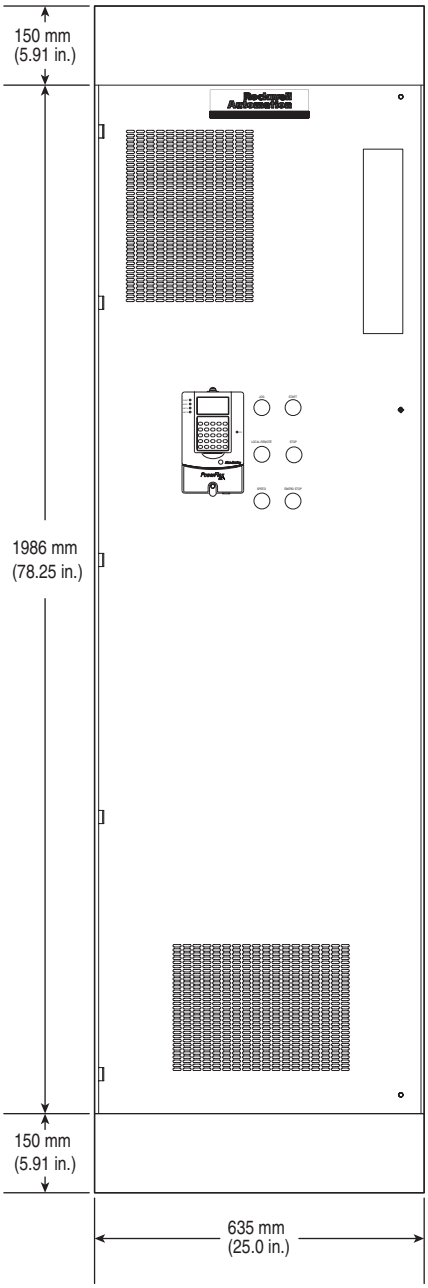
Please contact your local distributor or sales office for product availability. Configured Drives offers Quick Ship and Pre-Engineered Programs.

Configured Drive Enclosure Dimensions

Frame 1

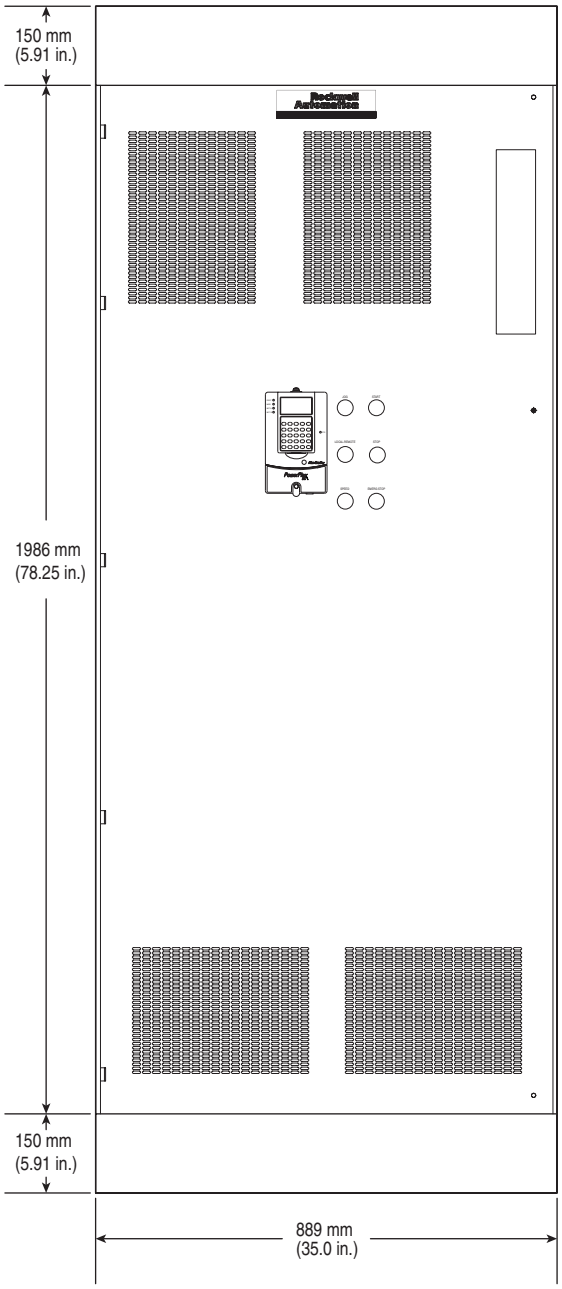


Frame 2



Configured Drive Enclosure Dimensions, Continued

Frame 3



Specifications

Category	Specification
Agency Certification	According to file E59272 for the series of the approved devices.
	The drive is also designed to meet the following specifications: NFPA 70 - US National Electrical Code

Category	Specification	
Drive Type	Full Wave Regen, 6 Pulse, Regulated Field Supply	
Protection	Heat Sink Thermistor:	Monitored by microprocessor overtemp trip
	Drive Overcurrent Trip Software Overcurrent Trip: Hardware Overcurrent Trip:	 200% of rated current (typical) 220-300% of rated current (dependent on drive rating)
	Line transients:	Up to 2000 volts peak per IEC 6100-4-5
	Control Logic Noise Immunity:	Showering arc transients up to 1500V peak
	Power Ride-Thru:	15 milliseconds at full load
	Logic Control Ride-Thru:	0.5 seconds minimum, 2 seconds typical
	Ground Fault Trip:	Phase-to-ground on drive output
	Short Circuit Trip:	Phase-to-phase on drive output
Environment(1)	Altitude:	1000 m (3300 ft) max. without derating. De-rate output power by 1.2% for every 100 meters (328ft) above 1000 meters (3300ft).
	Maximum Surrounding Air Temperature IP20, NEMA Type Open:	0 to 50 degrees C (32 to 122 degrees F), typical.
	Storage Temp. (all const.):	–25 to 55 degrees C (–13 to 131 degrees F)
	Atmosphere:	**Important:** Drive **must not** be installed in an area where the ambient atmosphere contains volatile or corrosive gas, vapors or dust. If the drive is not going to be installed for a period of time, it must be stored in an area where it will not be exposed to a corrosive atmosphere.
	Relative Humidity:	Operating: 5 to 85% non-condensing Storage: 5 - 95% non-condensing
	Shock:	15G peak for 11ms duration (±1.0 ms)
	Vibration:	0.152 mm (0.006 in.) displacement, 1G peak

(1) PowerFlex DC drives must be installed in a Pollution Degree 2 environment.

Category	Specification			
Drive Type	Full Wave Regen, 6 Pulse, Regulated Field Supply			
Electrical	Input Voltages:	230 to 480V AC +/- 10%, 3 Phase		
	Input Frequency:	50/60 Hz +/- 5%		
	Armature Output Voltage:	Two Quadrant Drives	Four Quadrant Drives	
		260V DC @ 230V AC	240V DC @ 230V AC	
		470V DC @ 400V AC	420V DC @ 400V AC	
		530V DC @ 440V AC	460V DC @ 440V AC	
		560V DC @ 460V AC	480V DC @ 460V AC	
		580V DC @ 480V AC	500V DC @ 480V AC	
	Output Horsepower (Cont.)	1.5 to 150 HP @ 230V AC 2 to 400 HP @ 460V AC		
	Output Current:	4.1 to 667A		
	Overload Capability:	100% rated continuous current 150% rated current for one minute then fault 200% rated current for three seconds then fault		
	Field Output Voltage	200V DC @ 230V AC 310V DC @ 400V AC 360V DC @ 460V AC Maximum field output voltage is 0.85 x AC input line voltage.		
	Controller Current Overload:	150% rated current for one minute 200% rated current for three seconds		
	Max. Short Circuit Ratings:	Input Voltage:	Converter Size:	Short Circuit Rating:
		230V AC	7A -180 A	5,000 A
			218 - 521 A	10,000 A
		460V AC	4.1 - 86 A	5,000 A
			100 - 330 A	10,000 A
			412 - 667 A	18,000 A
Control	Speed Regulation:*	All operating modes: Max. speed: 8000 rpm Digital reference resolution: 0.25 rpm Analog reference resolution: ≥ 0.25 rpm		
		with Digital Incremental Encoder 1000: 1 rpm, bi-directional Performance Accuracy 0.02% typical		
		with DC Analog Tachometer 100: 1 rpm DC tach bi-directional Performance accuracy 0.1%		
		with Armature Feedback 500: 1 rpm 5 rad/sec bandwidth		
		*Subject to motor specs, current loop tuning.		
	Torque Regulation	Resolution: 1:2000		
		Performance accuracy: 0.2% typical		
		Field regulation: 1:500		

Category	Specification	
Feedback Devices	Encoder	Type: Incremental, dual channel, two channel optional (with jumper), differential (recommended) or single-ended
		Input Voltage: Configurable for +2.5V - 5.2V (switch S21 in ENC_5 position) or +5.4V - 15.2V (switch S21 in ENC_12 position)
		Input Current: 4.5 mA / 6.8 - 10.9 mA each channel
		Quadrature: 90° ± 27° @ 25° C
		Duty cycle: 50% ± 10% Source/Sink capable
		Pulses Per Revolution: 150 to 9999
		Maximum Frequency: 150 kHz
		Maximum Cable Length: Shielded, 150m (0.75 mm^2), 125m (0.5 mm^2), 55m (0.22 mm^2)
	DC Analog Tachometer	Input Voltage: 22.7, 45.4, 90.7, 181.6, & 302.9V max.
		Input Current: 8 mA full scale
		Maximum Cable Length: Shielded, depends on the installation, typical 150m.
Inputs	Analog Inputs	Three configurable, isolated, differential
		±10V, 0-10V, 0-20mA or 4-20mA.
	Digital Inputs	Eight standard configurable, four additional configurable with the I/O Expansion circuit board.
		Max Voltage +30V DC input, 200mA (total current draw is the sum of encoder power, digital outputs and any other loads connected to terminal 19)
Outputs	Analog Outputs	Two standard configurable, two additional configurable with the I/O Expansion circuit board.
		± 10V, 5mA, bipolar (current is not bipolar)
	Digital Outputs	Four standard configurable, four additional configurable with the I/O Expansion circuit board.
		+ 30V, 50mA
	Relay Outputs	Two configurable, N.O. contacts
		Max. 250V AC, 1A AC1

Watts Loss

Watts loss data shown below is based on the rated current of the drive.

Important: For drives with 230V input, rated 150 hp / 521 amps, the cooling fans must be powered by an external 230V 50/60 Hz power supply at terminals U3 & V3.

Frame	Drive Current Rating Code(1)		Total Watts Loss (W)	Fans		
	@ 230V	@ 460V		Voltage (V)	Rated Current (A)	Air Capacity (m^3/h)
A	7P0	4P1	131	–	–	–
	9P0	6P0				
	012	010				
	020	014				
	–	019				
	029	027	186	–	–	–
	038	035	254	Internal power supply		80
	055	045				
	–	052				
	073	073	408			160
	093	086	476			160
	110	–				
	–	100	553			160
	–	129				
B	146	167	781			320
	180	–				
	218	207	939			320
	265	250	1038			320
	–	330	1248			320
	360	412	1693			680
	434	–				
C	521	495	2143	230	0.75	1050
	–	667	2590	230	0.75	1050

(1) Refer to Catalog Number Explanation on page 6, positions 8-10 for corresponding drive HP rating, armature amp rating and field amp rating.

Notes:

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